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FIFTEENTH BIENNIAL REPORT
OF THE
STATE GEOLOGIST
OF THE
STATE OF WYOMING



For the Period
October 1, 1928, to and Including
September 30, 1930

To the
Twenty-first Regular Legislative Session
1931

Fifteenth Biennial Report
OF THE
State Geologist

FOR THE PERIOD
OCTOBER 1, 1928
TO AND INCLUDING
SEPTEMBER 30, 1930

John G. Marzel, State Geologist
Cheyenne, Wyoming

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P. A. COLE -----Clerk

To His Excellency,
Frank C. Emerson,
Governor of the State of Wyoming.

Dear Sir:

Pursuant to the requirements of Section 302, Wyoming Compiled Statutes 1920, I have the honor to submit herewith the Biennial Report of the State Geologist for the period ending September 30, 1930.

The report sets forth the activities of the department and certain recommendations, statistics of mineral production for the years 1928 and 1929 and other pertinent statistics.

In the compilation of this work, I am indebted to the loyal members and employees of this department, to the United States Geological Survey and to the various oil companies and operators in the State for their aid and co-operation in furnishing and checking statistics herein contained.

My appreciation of the cordial interest you have always shown in the work of this department is hereby gratefully acknowledged.

Very respectfully submitted,

JOHN G. MARZEL,
State Geologist.

Cheyenne, Wyoming,
October 31, 1930.

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WYOMING

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Fifteenth Biennial Report of the
State Geologist

October 1, 1928, to and including October 1, 1930

CHAPTER I

HISTORY AND ACCOMPLISHMENTS OF THE OFFICE

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.

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.

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.

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 36-37-82, 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.

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.

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 C. S. Dietz, 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. In addition to this, the Deputy State Geologist has been required to make numerous qualitative analyses of mineral samples forwarded to this office for that purpose by prospectors and holders of mineral property. Numerous reports on various mineral occurrences were also prepared by him that were published in the press and various periodicals.

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.

CHAPTER II PUBLICATIONS

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.

Bulletin No. 21

By far the largest volume printed in the history of the State Survey was Bulletin No. 21, "Developed and Undeveloped Mineral Resources of Wyoming." This 194-page bulletin was received from the printers in February, 1929, and since its appearance, over 300 copies were requested by librarians. Within the past few months quite a few of the larger libraries in this country and abroad have applied for their second copies. Some of these were sold for \$1.00 and in other instances exchanges were made for out-of-print Federal reports long missing in our files. Already the 1,000-copy edition is exhausted and to supply increasing demands a more timely volume will have to be published.

By no means was the demand for the bulletin entirely due to this department. Since its appearance, beet growers in Wyoming and in nearly all of the surrounding states phosphated their lands for the first time. Already record-breaking crops have been obtained by the lately tried plant food. As the success of the venture became better known, trade journals and the larger fertilizer companies addressed inquiries to this office in regard to the suitability of Wyoming phosphate rock for the manufacture of the soluble product. Before the growers tried the experiment, this department recognized the potentialities contained in the then largely unheralded phosphate resources of Wyoming. As a result, a chapter in the bulletin provided the only published information available on the manufacture of phosphate salts wholly from the Wyoming angle.

The bulletin served to stimulate other interest in the raw chemicals of Wyoming. Several of its chapters have received much attention from widely known research staffs. In his letter of October 7th, the editor of the largest industrial chemical journal made the statement—"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 should be concentrated on Wyoming chemicals during the next biennium. At present, they attract far more attention from industrial organizations than any other form of resources appearing in this State. To merely reprint an edition of the exhausted bulletin would be a waste of money. In the bulletin some deposits and state areas had to be severely slighted, and in other instances manufacturing processes were suggested without the purchase or consultation of essential reference works known to be printed on the subject. Merely to prepare a revised edition on the quarter of the State in which a staff member conducted ten years of prior investigation would require more than six months of uninterrupted time. Manifestly, such a work would have to be supplemented with maps, illustrations, as well as other unpublished data on local market developments, technological advancements and other matters that seem to arouse the most enthusiastic interest among my growing list of correspondents.

As far as can be predicted, the next stepping stone in the industrial history of Wyoming should 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.

Bulletin No. 22

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.

Operating Regulations Circular No. 5

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.

Geological Text Books for Wyoming Libraries

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.

Elementary Geology

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 at this time that through these efforts and the co-operation of this Department, six High Schools have added Elementary Geology to their curriculum, these schools being at Lander, Lovell, Lusk, Rockypoint, Rock Springs and Sheridan. In addition to this, for the first time the State 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.

CHAPTER III EDUCATIONAL RESOURCES

Prior to this administration no serious attempt seems to have been made to point out the attractions that Wyoming offers for the study of several branches of natural science. During the present biennium considerable effort was expended in advertising a type of resource generally considered to be of a too tenuous variety to be listed as such. Efforts so far made within this neglected and rather fertile field also brought forth a number of extremely receptive replies.

Naturally, the classical laboratory that is Wyoming will always prove most inviting to students of the geological science. Nevertheless, it also presents opportunities in other fields of endeavor. In a letter addressed last summer to a professor of botany, mention was made of some other Wyoming attractions. Inasmuch as the letter also presents a quite seasonable summary on a new type of educational development in this State, it follows below in the complete form:

Professor of Botany,
Western State Teachers College,
Kalamazoo, Michigan.

Dear Professor:

Your welcome announcement that you are bringing 25 students of your botany class to Wyoming for the object of studying our variegated floral and faunal life reached my desk this morning. Permit me to congratulate you in selecting the rich Wyoming field as the logical site to lead your class to during the present summer season.

To the faunal naturalist, Wyoming has long remained a welcome paradise. Wyoming has a varied physiography and climate as well as tremendous natural resources. Moreover, it is among the foremost of our states in its wealth of natural scenery, culminating

in the grandeur of Yellowstone National Park, one of the wonders of the world. In addition to this distinction, Wyoming possesses vast open plains and lofty mountains whence flow the headwaters of mighty river systems emptying far away in both the Atlantic and Pacific oceans. The various slope exposures of our mountain ranges, the fertility of our intervening valleys or basins and the aridity of our desert spaces, present a study of geographic and vertical distribution of wild life that is in many particulars unique.

As you are aware, the study of geographic and vertical distribution of life with the governing factors and attendant problems is valuable as a matter of scientific research in general as well as in the attainment of practical erudition for the younger minds, in particular. Within the borders of Wyoming an extreme difference in altitude of 10,700 feet actually appears. Within this wide vertical displacement, the life zones range from the Upper Sonoran, at the lowest and warmest elevations, through the Transition, Canadian, Hudsonian to the Arctic-Alpine zone, the latter occupying the treeless crests of our highest mountain ranges.

Of the seven North American transcontinental life zones, only the Tropical and lower Sonoran are absent in this State. In all others a generous representation of plant and animal life is found. All told, due to the profound elevational differences and resultant precipitation and climatic changes, a student can observe within the course of one day a wider variation of wild life in the Wyoming Wonderland than he can possibly see anywhere else at least say on this side of Kalamazoo.

This propaganda bureau must apologize for the paucity of publications it has prepared about Wyoming on subjects appertaining to the highly specialized fields of science in which your activities are now chiefly confined. Unfortunately, neither this office nor any Federal Bureau has as yet published a genuine relief map of Wyoming. The best aid that I can offer for the physiographic studies of your class is our Wyoming contour map roughly drawn on a vertical interval of 1,000 feet. To point out the geological facts that you desire to emphasize during your forthcoming tour, I am also including a copy of the Areal Geology Map of Wyoming in the package addressed to you this day.

As now organized, fully 80 per cent of my funds are expended on the protection of the vitally important oil lands on which this State conducts big operations directly under its own name. With present personnel, only a small amount of scientific or quasi-scientific literature can be broadcasted about Wyoming. So far, the only bulletin that I have published on our faunal life is "The Dinosaurs of Wyoming", a copy of which is also being mailed to you. While having nothing to do about present day activities, it at least points out certain localities in this State in which fossil life did attain its most grotesque, bizarre and colossal stage of development for all time. It is possible that you will likewise include some of the more historic tomb sites, pointed out in that guidebook, in your itinerary. A volume recently published on the mineral resources of Wyoming, that has a chapter on local climatology is also included in the shipment that goes forward to you this day.

Yearly, an increasing number of colleges are learning the wisdom of conducting their divers field courses within the scenic and vacation playground that is Wyoming. For several sciences, it affords an unsurpassable background. At present three distant universities are holding their summer courses in field geology in this State. On your arrival, you will not exactly be a total stranger. Last year, your neighbor, the University of Michigan, constructed a

thoroughly modern camp in the Jackson Hole region as a permanent site to conduct their field courses in surveying directly over the most variegated types of terrain conceivable. Incidentally, that immediate locale also serves as the last stand for some of the most magnificent species of wild faunal life still habitant to the American continent. A wealth of lesser mammalian bird and fish life also happens to be convenient thereat for the observation and fascination of the more impressionable minds of zoologically inclined students.

Obviously, space in this letter cannot possibly permit the cataloging of the seemingly endless varieties of herbaceous plants, flowers, grasses, shrubs and trees that bedeck the surrounding precipitous mountainous slopes of our famous Jackson Hole clear from valley bottom to upper timber line and beyond. For botanical study, especially in the higher floral zones, no more complete natural laboratory within so small a compass is to be found in this country.

No botanical class can go wrong in visiting Wyoming. If in quest of learning, a serious mistake would be made in not visiting Wyoming. The big difficulty is that no class can possibly cover the entire gamut of our floral and faunal scale of life in one season in the field. To do all of that, you will have to return to Wyoming repeatedly. So far as my records disclose, no other school has yet chosen Wyoming as a site for its field course in botany. Much good should be reaped from your original labors and resulting discoveries within the particular Wyoming field in which you selected to blaze the trail. I sincerely welcome you and do assure you that many pleasant surprises await your visit to our State.

Very respectfully,

JOHN G. MARZEL,
State Geologist.

In recurring intervals of economic stress, this bureau may be justified in preparing publicity for the attraction of depression-proof industries to this State. No one can deny that through the combined activities of outside students considerable added information about our State is brought to light. Moreover, their expenditures do not retard the development of the several communities in which they conduct their field classes. Apparently, it pays to advertise the educational resources of Wyoming.

Other Scientific Expeditions in Wyoming

Through the labors of distinguished visiting savants, more sensational finds of fossil life were unearthed in this State during the past summer than since the seventies when the first North American discoveries of dinosaurs were exhumed in the Wyoming wonderland.

Four miles south of Torrington an expedition from Harvard University uncovered an Oligocene bone layer one-half mile long, varying in width from ten inches to three feet. Over 6,000 pounds of fossil material, chiefly of little known ancestral types of horses and rhinoceroses, were shipped therefrom for display in the Harvard Museum of Comparative Zoology.

At the same time, the Harvard expedition uncovered large quantities of bird material. Until last summer but few bird bones had been found anywhere in the Oligocene. Those discovered at Torrington are said to be in a state of preservation almost equal to the birds that were entangled in the La Brae tar pits of California during far more recent periods of time. The rich finds at Torrington will fascinate paleontologists and, as soon as they are better known, Wyoming will offer an added attraction for students and scientists to conduct basic research investigations.

The Smithsonian Institution also conducted a highly successful fossil hunting expedition in Wyoming during the past summer. The expedition was headed by their curator of vertebrate paleontology, C. W. Gilmore, who is one of the most widely known graduates of the University of Wyoming. From Eocene strata of the Bridger Basin, Dr. Gilmore and a staff of far-famed assistants shipped 24 cases of fossils weighing 7,400 pounds for exhibition in the halls of the great scientific institution of the National Government.

For many years past, the Bridger Basin locality south of Lyman has been recognized as one of the most varied and prolific fossil areas in the United States. Among the material exhumed this season were examples of ancestral horses, tapirs, a rhinoceros, and also exceedingly rare specimens of turtles, lizards and crocodiles. Bones from *Notharctus* skeletons were also found. In a subsequent interview in a Washington daily, Dr. Gilmore stated that studies of that primitive primate should shed much light on the origin of mankind, itself.

Heretofore, Wyoming's unusually rich wealth of existing faunal life has done its share to attract sportsmen and tourists to this State. From hence on scientists will also visit the Wyoming faunal paradise. These new visitors will study the far more varied and spectacular life examples of the geologic past. To inventory and disseminate information on the increasing number of marvelous finds made, this office, like several other states far less rich in fossilized life, may soon be compelled to add a paleontologist to its staff. Not all of us can be authorities on the subject and merely to talk understandingly on the importance of recent Wyoming discoveries, no paleontological candidate should be hired who has less than eight years of highly specialized collegiate training within that limitless field of science. In the meantime, to attract more students and gatherings of scientists to this State, this office should publish more bulletins on the type of its latest number—"The Dinosaurs of

Wyoming." In a geological sense the future welfare of Wyoming should not be wholly dependent on actual mineral production. Other ways are open to attract equally worthy activities to this State.

Lesser known institutions also conducted fossil hunting excursions over the promising Wyoming terrain during the past two-year period. As soon as their discoveries are published and exhibited, additional colleges and conventions will select Wyoming for their field of observation. Outside educational institutions are gradually recognizing Wyoming as the logical site for practical study and, in order that our youth may better know their Wyoming, organizations like the Rocky Mountain Oil and Gas Association and the State Mining Congress now annually pass resolutions asking that geology be taught in our own schools. Since my incumbency, six high schools in this State at Lander, Lovell, Lusk, Rockypoint, Rock Springs, and Sheridan, added geology to their curriculums.

Moreover, for the first time, the State Department of Education will conduct courses in practical prospecting. Announcements will soon be made of the classes for prospectors to be held in Casper and Laramie during the coming winter season.

Unusual Geologic Research Plan Successful in Adjoining State

A unique experiment made in Montana during the past summer has demonstrated how the practical development of a region can be greatly aided by cooperative geologic research work. The results were so promising and the method seems so especially applicable to Wyoming regions that a statement as to the purposes and results of the work referred to is obviously of particular interest to citizens of this State.

The aims of the undertaking mentioned have been the simultaneous advancement of science and the practical development of the mineral, educational and recreational resources of the region. The agencies active in the coordinated program of work were the Montana Bureau of Mines and Geology, scientists and students representing a number of universities and research institutions, the U. S. Geological Survey, the U. S. Army and the Northern Pacific Railway. The cost of the work last year was shared by Princeton University, the Northern Pacific and the U. S. Geological Survey, and for next year financial support from Montana sources has been offered in order that the work might go forward on an expanded scale.

One of the most important immediate results of such cooperation in Wyoming would be the making of airplane and topographic maps of important regions—these maps being usable alike for geologic surveying, mining development and irrigation, and for scientific work and outdoor education. That these scientific studies will also yield results of notable value and interest has already been demonstrated by the many newspaper accounts of the Red Lodge work which doubtless have come to the attention of all within this State.

Obviously, the method which has worked so well in the Red Lodge-Billings region would be at least equally effective in Wyoming, and when inquiries from Wyoming communities were addressed to Dr. W. T. Thom, Jr., of Princeton (leader of the Red Lodge research party) he stated that his group would be most happy to extend its operations southward if such a move would be agreeable to Wyoming, and if the State and the railroads interested would wish to cooperate on the same basis for cost sharing as applied in Montana.

Should these terms be met, it would mean that from Wyoming sources an appropriation would be made for airplane photographs and topographic maps (which could be used by mining men, oil producers, and Government and University scientists alike). To this Princeton would add a sum of \$2,500, also for topographic maps, and the combined total would then be matched dollar for dollar by the U. S. Geological Survey. The greatest part of this money would naturally be spent by field parties working in Wyoming. Work of the University scientists and of their student aides would be entirely without cost to the state and on reasonable salary estimates for the outstanding men involved may well be equivalent to a contribution in time and field outlay of \$10,000 a year. If this plan be adopted, arrangements between Princeton and the U. S. Coast and Geodetic Survey would also bring parties from this latter organization into the State for work during the coming summer (without expense to Wyoming). It, therefore, seems evident that rather than involving a burden upon the State this plan would really be a highly profitable piece of business for the State whether from the short-time or long-time point of view.

As stated by Dr. Thom, "The aim of the research group is to support and supplement the scientific work of State Geological Surveys and of the U. S. Geological Survey, because of obvious public importance and practical value of the work of these governmental agencies. Moreover, if our

group enters Wyoming, we of course hope to do so under cooperative arrangements which will be entirely satisfactory to the interested State officers, as has been done in Montana."

The ability of Dr. Thom's group to give important aid is evident when it is remembered that he formerly was in charge of U. S. Geological Survey work on coal and oil, and when it is known that the eastern organizations in the research group this past summer included (among others) members of Princeton, Yale, Chicago, Columbia, Cincinnati, Williams, Cambridge (England), Aachen and Freiburg (Germany), and the Carnegie and Smithsonian institutions. This group will probably be considerably increased next summer. Several Federal bureaus will be cooperating with it to the mutual benefit of all.

During the past twenty-five year period Dr. Thom has done considerable work in Wyoming while in the employ of the U. S. 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 this 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 Doctor's prior labors in this State, it is not surprising that he selected the 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 more than half financed by outside organizations under the arrangements proposed.

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 the investigations, they in turn should offer partial aid even if said communities are smaller than those in Montana in which similar work has already 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 plan for combined research work and 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 routine office work. With present personnel no surveys can be conducted in any part of the State. For completing acceptable surveys the Princeton plan of combined co-operative work by Federal Geologists 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 Grey-bull valley, near Cody, Wyo. 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 \$5,000 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 ten to twenty million years ago. The only other place in the world where dinosaur eggs have been discovered was in Mongolia.

* * * * *

"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, the recent find diverted too much attention from 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 these different discoveries on the part of trained groups of field specialists. Manifestly, if the educational attractions of Wyoming are to be correctly cataloged, our amateur fossil hunters are entitled to have their finds carefully scrutinized by the most widely recognized authorities in this country.

Across the line in Montana, the Princeton staff made discoveries last summer that startled the scientific world. If their labors are extended into the adjoining area, equally amazing discoveries should be made.

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 notice. 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, field-contact method of procedure.

Co-operative 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.

"Co-operative 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 the people are interested in mining geology. The advantage of cooperation is obvious.

"Colorado first appropriated \$500.00 for co-operative 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 the work. Lately 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 area.

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. Accordingly, in my budget estimate I asked

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 a 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 study at this critical 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, of extended mineralized areas exceeded by no state in the Union.

CHAPTER IV

WYOMING GEOLOGICAL SURVEY DEPARTMENTS

Field Geologist (Proposed)

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 summariz-

ing, 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.

Oil and Gas Conservation Department, Casper Office

The Casper office, under the direction of Frank B. Taylor, State Oil and Gas Inspector, 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 routine work of the Casper 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.

Division of Mineral Production

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 -----	34

CHAPTER V

PUBLICITY ACTIVITIES

Kansas Geological Society's Field Conference

John G. Marzel, State Geologist, C. S. Dietz, Deputy State Geologist and Frank B. Taylor, State Oil and 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.

Annual Mining Congresses

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

Mineral Exhibits at State Fairs

For the occasion of California's Diamond Jubilee (Seventy-Fifth) at the Annual State Fair and Western States Exposition held at Sacramento, California, on August 31st to September 10th, 1929, an elaborate display of 75 various minerals of common occurrence in Wyoming was prepared for exhibit by the Wyoming Geological Department.

This mineral exhibit was shown in conjunction with the displays of the Department of Agriculture, the Department



Mineral Exhibit at State Fair, Douglas, Wyoming, 1930

of Commerce and Industry and the University of Wyoming in the Wyoming booth at the Fair.

The entire exhibit was later shipped and displayed at the International Livestock Exposition at Chicago, the American Royal Exposition at Kansas City, the Aksarben Show at Omaha and at the Wyoming State Fair at Douglas, thereby gaining much publicity, favorable comment and attracting widespread attention to the varied mineral resources of the State of Wyoming.

1929

PROGRAM

Mining and Industrial Congress

Elks Club, November 15, 1929

Morning Session

Governor Frank C. Emerson Presiding

- 10:00 A. M.—Address of Welcome-----J. J. Early
Sheridan, Wyoming
- 10:10 A. M.—Opening Address-----John G. Marzel, State Geologist
Cheyenne, Wyoming
- 10:25 A. M.—Past, Present and Future of Metal Mining in Wyoming
Thomas M. Fagan, Attorney, Lusk, Wyoming.
- 10:55 A. M.—State University and Mining Development in Wyoming
R. L. Rhoades, Dean of Engineering, University of Wyoming,
Laramie, Wyoming.
- 11:00 A. M.—Announcement of Committees.
- 11:15 A. M.—Administration of the Public Domain.
Hon. Perry W. Jenkins, Member Commission on Conservation and Administration of the Public Domain, Big Piney, Wyoming.
- 11:45 A. M.—Discussion and Questions from the Floor-----Everybody

Afternoon Session

Ray T. Baird of Powell Presiding

- 2:00 P. M.—Mining Publicity-----Frank L. Byron
General Manager, Byron & Royce Mining Syndicate,
Casper, Wyoming
- 2:20 P. M.—Report of Mining Committee-----G. R. Hagens, Chairman
Casper, Wyoming
- 3:00 P. M.—Discussion and Questions from the Floor-----Everybody
- 3:15 P. M.—A Discovery of Gold in Bull Loaf Quartz---E. W. Burritt
Mining Engineer, Casper, Wyoming.
- 3:35 P. M.—Adult Mining and Industrial Education in Wyoming.
F. M. Treat, State Supervisor Trade and Industrial Education,
Cheyenne, Wyoming.
- 3:55 P. M.—Discussion and Questions from the Floor-----Everybody
- 4:10 P. M.—Co-operative Aid with the U. S. Geological Survey.
Hon. A. H. Maxwell, Attorney, Lander, Wyoming.
- 4:50 P. M.—Discussion and Questions from the Floor-----Everybody

Evening Entertainment

Theater Party (Lotus)-----Featuring Wyoming Films

November 16, 1929

Morning Session

W. F. Wilkerson of Casper Presiding

- 10:00 A. M.—Mining as a Manufacturing Industry-----E. F. Fader,
Metallurgist, Los Angeles, California.
- 10:25 A. M.—Discussion and Questions from the Floor-----Everybody
- 10:30 A. M.—Importance of U. S. Bureau of Mines in the West to the
Coal Industry-----Herbert Tomlinson,
Mining Engineer in charge Coal Mining Investigations,
U. S. Bureau of Mines, Salt Lake City.
- 10:55 A. M.—Discussion and Questions from the Floor-----Everybody
- 11:05 A. M.—Mining Possibilities in the Big Horn Mountains.
James M. Taylor, Sheridan, Wyoming.
- 11:30 A. M.—Conversion of Wyoming's Raw Material into Finished
Products Within Wyoming-----W. K. Cole,
President Wyoming Manufacturers Association, Sheri-
dan, Wyoming.
- 11:50 A. M.—Discussion and Questions from the Floor-----Everybody

Afternoon Session

Harry R. Weston of Jackson Presiding

- 2:00 P. M.—General Business Conditions-----W. F. Wilkerson,
Vice-Chairman Department of Commerce and Industry,
Casper, Wyoming.
- 2:20 P. M.—Fabrication of Steel in Wyoming-----P. J. Theisen,
General Manager, Sheridan Iron Works, Inc., Sheridan,
Wyoming.
- 2:40 P. M.—Northeast Wyoming Open Forum.
Speakers from Crook, Weston, Campbell, Johnson and
Sheridan Counties.
- 4:30 P. M.—Report and Recommendations of Resolutions Committee.

Evening Entertainment

Idlewild Cafe

- 6:30 P. M.—Wyoming Products Dinner.
Chas. J. Oviatt, Toastmaster.
Women's Opportunity in Wyoming's Progress,
Mrs. E. C. Raymond, President Wyoming Federation
Women's Clubs.
Contraalto Solo—Selected-----Marguerite Johnstone
Dude Ranching, a Major Wyoming Industry--Irving H.
Larom.
President Montana-Wyoming Dude Ranchers' Association
Wyoming Looking Forward-----Hon. Frank C. Emerson,
Governor of Wyoming.

**Resolutions Adopted by Delegates Assembled in Third An-
nual Convention at Sheridan, Wyoming,
November 15 and 16, 1929**

Preamble

Whereas, the Third Annual Mining and Industrial Congress is in
session assembled in the City of Sheridan, Wyoming, November 15th

and 16th, 1929, under the auspices of the State Department of Com-
merce and Industry, and

Whereas, we recognize that the purpose of said congress is to
encourage the development of the potential mineral and industrial
resources of Wyoming, we

Therefore, offer the following resolutions:

Fees and Rentals

Whereas, Filing Fees and Annual Rentals for mineral claims on
state land are so high that they tend to retard development of Wy-
oming's precious and non-precious minerals, and

Whereas, filing fees and rentals on a forty (40) acre tract are
the same as for a 640 acre tract of mineral bearing land,

Therefore, Be It Resolved, that it is the sense of this Congress
that filing fees and annual rentals now exacted by the state for
mineral leases should be materially reduced, and that the rental
charges be proportioned on the number of acres included in each
lease, and such rental should be only nominal during the prospecting
period.

Longer Time Leases

Whereas, five-year leases for the mining of metalliferous, non-
metalliferous, chemical and other commercial ores and elements are
too short to permit economical development and give proper degree of
protection to the successful prospector or developer,

Therefore, Be It Resolved, that for the purpose of encouraging
mining development on state owned lands, we earnestly urge the
constituted state authorities in the future to grant leases for mining
of metalliferous, non-metalliferous, chemical and other commercial ores
and elements for periods of 20 years and for so much longer as they
can be profitably mined or extracted, and that the area be not lim-
ited to 640 acres.

Official Assay Office

Whereas, the maintenance of an official assay office is necessary
in the development of the mineral resources of the state,

We, therefore, recommend that the state assay office at the Uni-
versity be continued and that those in charge of the administration of
that department of the University be encouraged, to the end that they
may keep in touch with, and distribute facts and information from
time to time, to prospectors, mining men and others interested in
developing the mineral resources of the state.

State Committee

Whereas, there is an apparent need for greater co-operative
effort on the part of all citizens interested in the development of the
mineral resources of Wyoming,

We, therefore, recommend that the Board of Commerce and In-
dustry, with the advice and counsel of State Geologist John G. Marzel,
select a "mining minded" citizen from each of the 23 counties of the
state to serve on the state mining committee, originally known as
the Committee of Eleven, that each member appointed be charged
with the responsibility of obtaining a place on the program of each
Chamber of Commerce, commercial organization, and Service Club
at least twice during the year, for a well informed speaker to discuss
the development of Wyoming's mineral resources, that he call into
conference and act as chairman, all those in his county directly inter-

ested in mining at a convenient date prior to the next Mining Congress.

The purpose of the conference shall be to stimulate interest in mining—lay a foundation for the success of the 1930 Mining Congress, and for the consideration of legislation pertaining to the infant mining industry in Wyoming.

Schools and Libraries

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.

Whereas, the public schools of this state are supported in part by a tax on minerals produced and directly by mineral royalties, and

Whereas, school children, the future citizens of Wyoming, should be more familiar with our mineral resources, their development, and economic potentialities,

We, therefore, recommend that whenever practical, men and women, trained in mining and mineralogy, be employed on high school faculties to teach subjects related to the mining industry, and when the demand exists, that classes in vocational mineralogy be organized.

Research Work

The petroleum industry of Wyoming is of such great importance, not only to Wyoming but to the West, that we approve the research work in petroleum now being conducted by the United States Bureau of Mines in the laboratory at the University of Wyoming; realizing also the large contribution being made to the federal treasury from the oil industry in Wyoming,

We, therefore, recommend that federal authorities be earnestly urged to continue the support of this government station, and to enlarge its activities.

Experiment Stations

Whereas, more than 38 states have found it necessary and desirable for the development of their states to establish strong engineering research experiment stations, and realizing the extreme importance of such service to Wyoming with its large undeveloped resources, and knowing that the College of Engineering of the University of Wyoming is now in position with buildings and necessary laboratories to assist the State Department of Geology or other similar agencies by analyzing and assaying minerals, and publishing and abstracting existing literature,

Therefore, this Congress recommends to the Governor and the next State Legislature that an adequate appropriation be made for the establishment of an Engineering Experimental Research Station at the University of Wyoming to cooperate in these fact-finding activities with the State Geological Department.

Mining Census

Whereas, with decreasing margins between costs and selling prices, the information that is available thru the Census of Manu-

facturers and Distribution is of great value as a guide to volume, markets, distribution, etc.,

Therefore, be it resolved that the Wyoming Mining and Industrial Congress go on record as urging the extension of this census as recommended by the advisory committee on the census of manufacturers appointed by the Secretary of Commerce.

And be it further resolved that the members of this Congress give cooperation and assistance in the furnishing of information and data as may be requested by the Census Bureau.

Protective Tariff

Whereas, the State of Wyoming has several large deposits of sodium sulphate, and other mineral salts, asbestos, chrome iron ore, manganese and other deposits of metallic and non-metallic minerals, and

Whereas, sodium sulphate, asbestos, chrome iron ore and other minerals produced in Wyoming are on the free list in the new tariff bill H. R. 2667, now being considered in the United States Senate,

Therefore, this Congress recommends to the Wyoming congressional delegation, that consideration be given to Wyoming's Mineral Resources to the end that reasonable tariff protection may be secured for such Wyoming minerals as may need this protection.

North-South Railroad

Whereas, large areas in Wyoming containing vast mineral resources, populated with small towns and settlements, the development and growth of which are practically prohibited by the lack of adequate railroad transportation facilities, and

Whereas, during a large portion of the fall, winter and spring months, travel between these settlements is attempted only under the spur of greatest urgency, and

Whereas, it is necessary for freight and passengers to travel a long distance into Montana, or into South Dakota, on a rail journey from Sheridan county, to the State Capitol at Cheyenne or to any other point in Central or Southern Wyoming,—conditions being the same in reversing the route of travel,

Therefore, be it resolved, that it is the sense of this Congress, that the granting of the certificate of convenience and necessity for construction and completion of the proposed Wyoming-Montana Railroad should be effected at once, that proper development and means of growth may be afforded the areas now handicapped by the lack of railroad transportation.

Publish Proceedings

We recommend—that the State Geologist and/or the Board of Commerce and Industry, prepare and publish the proceedings of the 1927 and 1928 sessions of the Congress as soon as possible, so that copies will be available to all interested citizens—and that the proceedings of future sessions be published annually.

Lander Chosen

We recommend that the invitation of Lander for the 1930 Congress be accepted and the date be set by the Board of Commerce and Industry in July or August.

Acknowledgments

Resolved, that this Congress extend its sincere appreciation for the splendid courtesies extended by the citizens of Sheridan, the Sheridan Commercial Club, the Elks Club, the Lotus Theatre, the Sheridan Post-Enterprise and Sheridan Journal, to the speakers on the program, the committee of 23, and the members of the State Board of Commerce and Industry.

Be it further resolved, that the Congress express its appreciation to the members of the Wyoming Press Association for their fine cooperation during the past year, especially in the publicity given in connection with the sessions just closing.

Respectfully submitted,

COMMITTEE ON RESOLUTIONS,
CHARLES B. STAFFORD,
KENNETH BELLOWES,
GEORGE HAYWOOD,
E. F. FADER,
JOHN FLINT.

1930

PROGRAM

Friday Morning, August 29, 1930

W. F. Wilkerson, of Casper, Presiding

- 10:15 A. M.—Address of Welcome-----
-----A. H. Maxwell, Attorney, Lander, Wyo.
10:25 A. M.—Opening Address-----
-----John G. Marzel, State Geologist, Cheyenne, Wyo.
10:40 A. M.—Past, Present and Future of Metal Mining in Wyoming-----
-----Thomas M. Fagan, Attorney, Lusk, Wyo.
11:10 A. M.—Discussions and Questions from the floor---Everybody
11:20 A. M.—“The Work and Aims of the University Assay Service”-----
-----A. C. Dart, Asst. Prof. of Metallurgy University of Wyoming, Laramie.
11:45 A. M.—Discussion and Questions from the floor---Everybody
11:55 A. M.—Announcement of Committees.

Afternoon Session

Ray T. Baird, of Powell, Presiding

- 2:00 P. M.—Conservation of Public Domain-----
-----Hon. Perry W. Jenkins, Member Commission on Conservation and Administration of Public Domain, Big Piney, Wyo.
2:40 P. M.—Discussion and Questions from the floor---Everybody
3:00 P. M.—Ethics of the Mining Promoter-----
-----Frank L. Byron, General Manager, Byron & Royce Mining Syndicate, Casper, Wyo.
3:25 P. M.—Discussion and Questions from the floor---Everybody
3:35 P. M.—Annual Report of Mining Committee-----
-----G. R. Hagens, Chairman, Casper, Wyo.
4:10 P. M.—Discussion and Questions from the Floor---Everybody
4:20 P. M.—Mining as a Manufacturing Industry-----
-----A. J. Hazlett, Publisher, The Inland Oil Index, Casper, Wyo.
4:50 P. M.—Discussion and Questions from the floor---Everybody

Evening Entertainment

- 8:00 P. M.—Band Concert, Lander Band.
9:00 P. M.—Theatre Party.

Saturday Morning, August 30, 1930

Governor Frank C. Emerson, Presiding

- 10:15 A. M.—Wyoming Bentonite--Paul R. Peterson, Cheyenne, Wyo.
10:45 A. M.—Discussions and Questions from the floor---Everybody
10:55 A. M.—Cooperative Surveys between the U. S. Geological Survey and the State of Colorado-----
-----G. F. Loughlin In Charge Work on the Geology of the Metals, U. S. Geological Survey, Denver, Colo.
11:25 A. M.—Discussions and Questions from the Floor---Everybody
11:35 A. M.—Mining and Industrial Education in Wyoming-----
-----F. M. Treat, State Supervisor Trade and Industrial Education, Cheyenne, Wyo.
11:55 A. M.—Discussion and Questions from the floor---Everybody

Afternoon Session

Harry R. Weston, of Jackson, Presiding

- 2:00 P. M.—“Transportation—The People’s Problem”-----
-----C. D. Morris, Chairman Western Railways Committee on Public Relation.
2:30 P. M.—Discussion and Questions from the floor---Everybody
2:40 P. M.—Open Forum-----
-----For Speakers Interested in Mining in Wyoming
3:40 P. M.—Discussion on the Identification of Minerals-----
-----C. S. Dietz, Deputy State Geologist, Cheyenne, Wyo.
4:30 P. M.—Report and Recommendations of Resolutions Committee

Evening Entertainment

- 6:30 P. M.—Banquet.

Resolutions Adopted by Delegates Assembled in Fourth Annual Convention at Lander, Wyoming, August 29 and 30, 1930

Recommendations covering urgent and future needs of the mining industry of the state were incorporated by the Wyoming Mine Congress which held its annual meeting in Lander, on Friday and Saturday of last week. They include reference to state rights to public land mineral deposits, fees and rentals and the need for longer term leases to encourage prospecting and development, together with other requests.

The resolutions as submitted by a committee consisting of Chas. B. Stafford, Paul R. Peterson and Marshall Graham, and adopted by the convention, follow in full:

Preamble

Whereas, the Fourth Annual Mining Congress is assembled in the city of Lander, Wyoming, August 29th and 30th, 1930, under the auspices of the State Department of Commerce and Industry, and

Whereas, we recognize that the purpose of said congress is to encourage the development of the potential mineral and industrial resources of Wyoming, we therefore offer the following resolutions:

No. 1

Whereas, the President of the United States has appointed a commission to study the public land problems of the western states with the view of making recommendations to Congress looking to the return of public lands to the respective states of all public lands including all surface and sub-surface rights. The mineral rights therein, however, to be held and disposed of by the states under similar laws, rules and regulations, to be enacted by them as are now provided for through lease or sale by the United States.

No. 2

Fees and Rentals

Whereas, Filing Fees and Annual Rentals for mineral claims on state lands are so high that they tend to retard development of Wyoming's precious and non-precious minerals, and

Whereas, filing fees and rentals on a forty (40) acre tract are the same as for a six hundred forty (640) acre tract of mineral bearing land,

Therefore, be it resolved, that it is the sense of this Congress that filing fees and annual rentals now exacted by the State for mineral leases should be materially reduced and that the rental charge be proportioned on the number of acres included in each lease, and such rental should be only nominal during the prospecting period.

No. 3

Whereas, five year leases for the mining of metalliferous, non-metalliferous, chemical and other commercial ores and elements are too short to permit economical development and give the proper degree of protection to the successful prospector or developer—

Therefore, be it resolved, that for the purpose of encouraging development on state owned lands, we earnestly urge the constituted state authorities in the future to grant leases for mining of metalliferous, non-metalliferous, chemical and other commercial ores and elements for periods of 20 years and for so much longer as they can be profitably mined or extracted, and that the area be not limited to 640 acres.

No. 4

Schools and Libraries

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.

No. 5

Whereas, the advantage of vocational training having been fully demonstrated in Wyoming, we therefore urge that vocational training in mining and mineralogy be extended as rapidly as possible. Mining companies, local school boards and the state division of vocational education are requested to cooperate in the development of this work.

No. 6

Whereas, at the last session of the Mining Congress the following resolution was adopted:

Whereas, the public schools of this state are supported in part by a tax on minerals produced, and directly by mineral royalties, and

Whereas, school children, the future citizens of Wyoming, should be more familiar with our mineral resources, their development, and economic potentialities,

We, therefore, recommend that whenever practical, men and women, trained in mining and mineralogy, be employed on high school faculties to teach subjects related to the mining industry, and when the demand exists, that classes in vocational mineralogy be organized.

Whereas, only five high schools have so far responded to this suggestion, we therefore recommend that this resolution be submitted again to each high school not already cooperating and their compliance with the request of the resolution be solicited.

No. 7

Official Assay Office

Whereas, the maintenance of an official assay office is necessary in the development of the mineral resources of the State,

We, therefore, recommend that the state assay office at the university be continued and that those in charge of the administration of that department of the university be encouraged, to the end that they may keep in touch with, and distribute facts and information from time to time, to prospectors, mining men and others interested in developing the mineral resources of the State.

No. 8

Research Work

Whereas, the petroleum industry of Wyoming is of such great importance, not only to Wyoming but to the West, that we approve the research work in petroleum now being conducted by the United States Bureau of Mines in the laboratory at the University of Wyoming.

We, therefore, recommend that federal authorities be earnestly urged to continue the support of this government station, and to enlarge its activities.

No. 9

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 metallic and non-metallic in the State, and

Whereas, the United States Geological Survey is equipped and prepared to make topographical maps, geological maps and geological 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 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 investigations of the most promising areas in Wyoming.

No. 10

Whereas, the people of Wyoming are becoming more and more impressed with the advantages of using Wyoming products and Wyoming materials, especially in connection with the building of public works, and

Whereas, the State of Colorado and other states have enacted laws making compulsory the use of materials produced within the state wherever possible on public work, and

Whereas, Colorado and other states favor the use of state products in connection with the building of public works to the extent that they give state products the advantage of a five per cent differential over products from outside the state,

We, therefore, recommend that the Committee of Eleven be requested to sponsor and handle a bill in the next legislature which shall provide that a five per cent differential or advantage be allowed on Wyoming products manufactured from raw Wyoming materials in competition with similar materials for use in building public works in Wyoming, from Colorado and other states, that give preference to their state products.

No. 11

Cooperative Effort

Whereas, there is an apparent need for greater cooperative effort on the part of all citizens interested in the development of the mineral resources of Wyoming, and

Whereas, the resolution passed at the Sheridan meeting last year recommending that talks be given by well informed mining men before the commercial organizations and service clubs of the State, has been productive of tangible results in the dissemination of information regarding mining properties and mineral development, we therefore recommend that the Committee of Eleven be requested to continue its educational work and that consistent effort be made to place speakers well informed on mineral development on the programs of representative commercial organizations and service clubs during the coming year.

No. 12

We recommend, that the State Geologist or the Board of Commerce and Industry, prepare and publish the proceedings of the 1927, 1928, and 1929 sessions of the Congress as soon as possible, so that copies will be available to all interested citizens, and that the proceedings of future sessions be published annually.

Respectfully submitted,

COMMITTEE ON RESOLUTIONS,
CHARLES B. STAFFORD,
PAUL R. PETERSON,
MARSHALL GRAHAM.

CHAPTER VI

THE MINERAL INDUSTRY OF WYOMING IN 1929

Many important developments occurred within the Wyoming Mineral Industry during 1929. An unforeseen ruling noticeably hindered continued exploration for oil in this state, and, owing to the greatly increasing use of gas for fuel, the market for coal was slightly restricted. In all other divisions the developments and expansions generally exceeded those reported for any previous year.

Oil Production

In 1929 the oil production from all fields in the state will total close to 19,096,000 barrels. The value of the oil will approximate \$23,813,000.00. In the preceding year 21,407,250 barrels of oil, worth \$26,694,840.75, were produced.

Retrenchment Policy on Federal Lands

No new fields were opened in Wyoming in 1929 and during the year wildcatting was visibly curtailed by the Presidential Order of March 12, that withdrew Federal Lands from prospecting operations.

As the bulk of the Wyoming oil is produced on the Public Domain, operators had to confine their exploratory activities to known areas rather than search for new ones. Until new pools can be discovered to hold up the output of oil, declines in volume from the older fields must be expected to continue.

The restrictions against prospecting activities in Wyoming has already caused drilling concerns to turn their attention to other states. During the year more oil prospecting operations were conducted in the adjoining states of South Dakota and Idaho than ever before. In a recent press dispatch, the State Geologist of Nebraska announced that leading oil companies will expend \$1,000,000.00 in searching for oil in the western portion of his state during coming field season. In all of these fringing areas, geologic conditions, long proven to exist in Wyoming, are hoped to be confirmed. While exploratory operations are extremely costly in the decidedly more speculative areas mentioned, nevertheless, the fact remains that drilling companies can actually lease the requisite solid acreages from private owners in our neighboring states free of all forms of Federal exclusions. Should their activities lead to a discovery of a large pool, the position that Wyoming has long enjoyed

as the premier oil producing state of the Rocky Mountain area may at last be seriously jeopardized.

As yet the most widely quoted opponents of the Federal withdrawal have been able to maintain their claims that the Rocky Mountain area is free of overproduction evils. Should operations now being conducted in adjoining states lead to new discoveries, far more evidence would be on hand to destroy their contentions. Manifestly, no race for oil supremacy within entire Rocky Mountain region can be fair until each and every state is free to enter a common pathway equally open and unobstructed to all comers.

Progress Made on State Land Operations

During the year production on lands owned by the State of Wyoming was managed with a degree of proficiency that caused but little criticism.

Last October the lease on famous Section 36 of the Salt Creek field was renewed for the legal 5-year period at the former royalty rate of 65 per cent. By this time few can doubt the ability of the State Land Board to exact royalties of record-breaking magnitudes from a school section producer that has already returned \$10,000,000.00 directly into the Public Treasury.

During the year some critics saw fit to advance the theory that the State was not realizing fullest recovery values from operations conducted on Section 36. Among other things it was contended that high pressures were forcing its oil content to adjoining Federal Lands where it could be removed and recovered under far more favorable royalty terms. Those rumors caused the Governor to personally conduct an exhaustive investigation of conditions now prevailing, not only, on the state section, but also, throughout the entire field as a whole. Physical tests performed with an engineering degree of exactitude conclusively demonstrated that the criticism was entirely groundless, and that now, as well as from hence on, the oil content of Section 36 will only be extracted by operations conducted directly thereon or therein. Routine investigations of this character are of much concern to large taxpayers. Unless conclusively performed from time to time, many people would lose confidence in the ability of the State to assume a proprietorship involving tasks and responsibilities quite equal to the management of one of the larger and more successful corporate enterprises of the day.

NATURAL GAS INDUSTRY

A new all-time record was established for gas production in Wyoming during 1929. This highly gratifying situation resulted from intensified developments and expansions mainly undertaken in the Baxter Basin, Hiawatha, Billy Creek, and the new Pilot Butte fields. For the first time several of the operating companies devoted more attention to the gas than the oil fields of this state.

In 1929 Wyoming produced 56,664,383,000 cubic feet of gas, valued at \$2,266,575.52, compared with the 1928 production of 47,256,306,000 cubic feet, valued at \$1,890,252.00.

Pipeline Completion

The most important financial undertaking in Wyoming during 1929 was the construction of the great Wyoming-Utah gas line system. This 334-mile long network was completed in September at a cost of \$18,000,000.00. It connects the Baxter Basin and Hiawatha fields with the leading cities of Utah.

Some recent press reports mentioned that control of the new public utility system has already passed to companies largely owned by Secretary Mellon and family. In some quarters it is believed that the initial entry of these powerful interests into the state is the forerunner of a broad program of development in the promising southwestern Wyoming field. Moreover, considerable talk has already appeared in newspapers in regard to extending the new line into Idaho as well as to more distant points in Oregon and Washington.

Additional Cities Connected with Gas

In my statistical review published a year ago, predictions were freely made that, in addition to the 21 Wyoming towns and cities then supplied with natural gas, six of the principal cities remaining in the state would also soon enjoy the conveniences offered by the more efficient fuel. The new Wyoming-Utah line connected two of those cities, Green River and Evanston, and at the end of this year the Smith interests of Iowa made the announcement that they had contracted for the gas production of the Billy Creek field and would lay early next summer a 55-mile long pipeline to market the output in Buffalo and Sheridan, two other seats of county government mentioned in last year's review.

The showing of financial responsibility made by the designated interests was pronounced satisfactory by the

Wyoming Public Utility Commission, and accordingly, on December 16, a franchise was granted for the new construction. Operations like these will sizably expand the domestic market for the vast reserves of natural gas already proven in this State, irrespective of restrictions now in effect in regard to increased development work on the Public Domain.

A Typical Industry of Modern America

The natural gas industry in the United States continues to grow more rapidly than at any period since its discovery nearly 100 years ago. At present the consumption of the nation takes 96 per cent of the total output of the world. No other nation could afford to develop and consume so valuable a commodity on a scale so liberal and reckless. Manifestly, no single product differentiates life in America from balance of world so completely as natural gas.

As yet I hear of no over-production evils affecting this typical American industry at any point. On the contrary, some of the older states severely complain about shortages of supply in their once abundant gaseous fuels. In view of unrestricted developments elsewhere, Wyoming may soon be hard pressed to retain its commanding position as the seventh largest gas producing state of the Union.

A New Industrial Announcement

Until the past two years gas was used almost exclusively as a superior heating agent. In West Virginia natural gas wells now supply large chemical works, recently constructed, with the basic hydro-carbons from which a wide range of costly organic compounds are built up when united with acetylene. The more important of these new gas synthetics include the latest solvents used in the rubber and lacquer industries; ethylene glycol, the basis of Prestone, the more efficient coolant now used in auto and airplane engines, as well as acetone, the foundation of the new rayon industry.

In view of the foregoing industrial trend, the largest manufacturers of acetylene, the Prest-O-Lite Company, announced in October that Casper had been selected for their first plant location in the Wyoming field. The arrival of the powerful and progressive chemical organization can be looked upon as an important milestone in the industrial development of the State.

In the review published a year ago, the statement was ventured—"Gas should lead the vanguard in the attraction

of industries to our state." From the union of forces locked up in gaseous molecules with potentials extracted from high tension hydro-electric current, research workers have lately evolved extremely powerful resultants in the way of chemical energizers. The use of these highly concentrated forms of labor eliminators is constantly expanding in this leisure-loving age, and elsewhere costly plants are now being built for their manufacture. In this review it will suffice to state that more attention than ever is now being focused on the evermore alluring Wyoming combination of gaseous fuels of maximum calorific power, low cost hydro-electrical possibilities plus an unusually complete variety in the basic stores of raw chemicals.

OTHER PRODUCTS OF THE PETROLEUM INDUSTRY

During the year, normal volumes of gasoline lubricating oils, road oils, asphalt, paraffines, coke, carbon black and other manufactured products were turned out by the refineries and various extraction plants located within the State.

In their finished form, the value of these products greatly exceeded that of the oil and gas crudes from which they were derived. While some economists have long been in the habit of crediting these finished products to the Wyoming mineral industry, they nevertheless should receive an industrial classification. To avoid duplication, they generally are so considered by the Federal statisticians.

Carbon Black

For preceding products the State Oil and Gas Inspector has so far only been able to obtain the figures on carbon black. In 1929, Wyoming produced 6,011,367 pounds of carbon black, valued at \$360,682.02, compared with the 1928 production of 5,250,700 pounds, valued at \$315,042.00. This increase should suffice to retain Wyoming's rating as the third largest producer of carbon black.

Road Oil

Another manufactured product for which an increased market originated in 1929 was road oil. For this improvement considerable credit can be extended to the State Highway Commission. In 1929 more miles of oiled highways were constructed in Wyoming than in all previous years.

Traffic research studies and investigations of an economic character so far conducted by the engineers of the Highway Department appear to have conclusively demonstrated that for the Wyoming type of highway no construc-

tion material can take the place of road oils refined directly within Wyoming. The new type of construction is becoming increasingly popular among the motorists, and so far, the leading civic organizations of the State have all passed resolutions for more oiled highways in their respective localities.

The \$2,800,000.00 bond issue passed by the recent Special Session of the Legislature will permit the completion of additional mileages of oil roads at a considerably advanced date. According to calculations received from the Materials Engineer, to oil the entire 3,000-mile long Federal Highway system about 2,000,000 barrels of oil would be consumed. Our long shut-in black oil pools could readily furnish the requisite raw material not only for Wyoming, but also for all like programs that may be adopted by neighboring states.

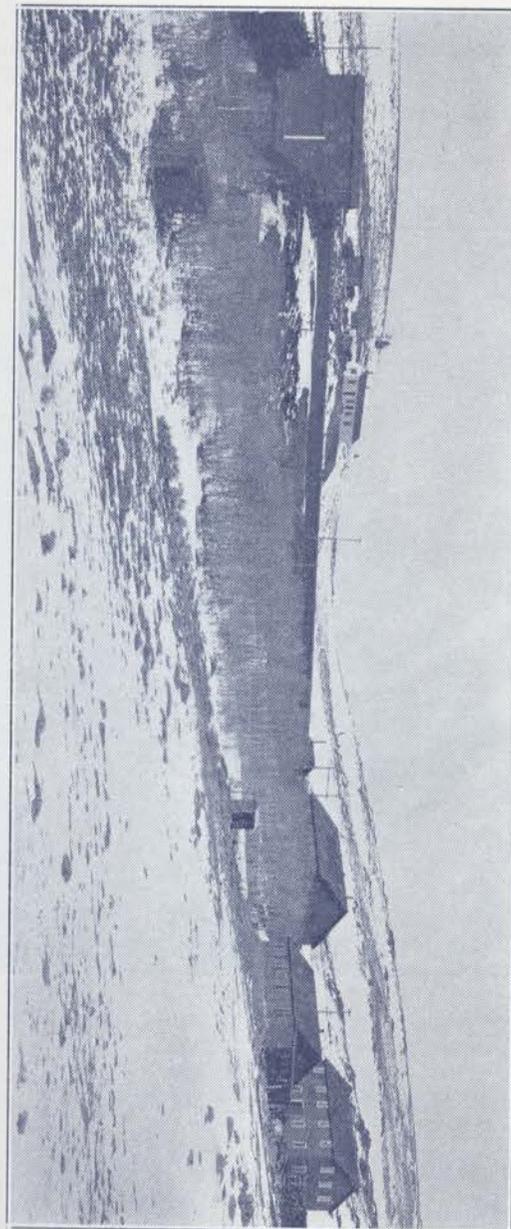
Service tests concluded by the Highway Department have unmistakably proven the ability of the Wyoming asphaltic oils to stand the duty performed by the best foreign oils originally imported into the State for comparative studies.

COAL

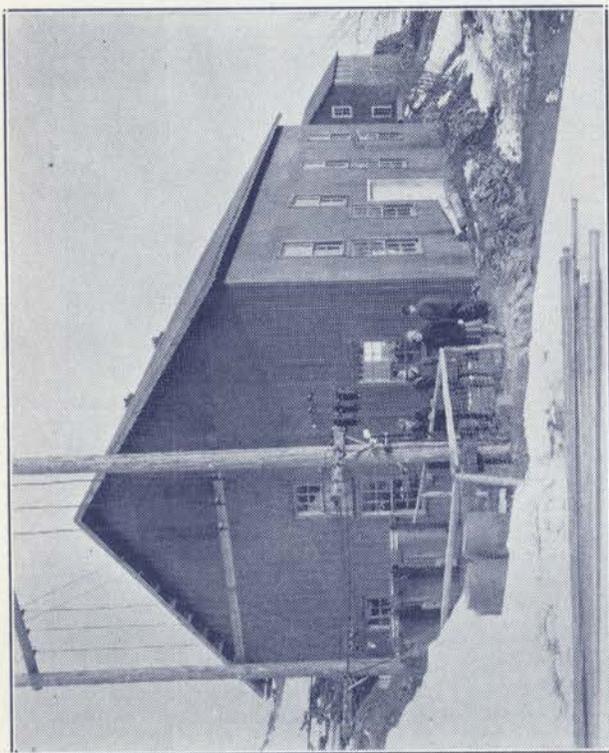
In a wire received from Lyman Fearn, State Coal Mine Inspector, the coal production for 1929 was estimated at 6,450,000 tons. The value of this production will approximate \$18,000,000.00 at the mine. In 1928, 6,553,174.70 tons of coal were mined.

Conditions throughout America and the rest of the world remained decidedly unfavorable for the coal industry. Technologists are continually getting far more useful heat out of a pound of coal. Within past decade decline in consumption in railroad locomotives reached 21 per cent and in the larger power houses of utility companies, increased efficiency now requires 39 per cent less coal per unit of work done than eight years ago. Manifestly, these scientific advances are far too severe to be offset by normal market or population gains.

In Wyoming the operator must not only battle the efficiency hound, but also must witness the loss of his domestic market by the general substitution of gas for coal as a heating agent in nearly all of our leading cities. But that statement does not mean that the Wyoming miner is ready to say quit. In mining advancement and low cost production his mines are rapidly attracting world wide fame. For retaining the traditions of a basic Wyoming industry that even antedates the creation of the Territory, thanks are mostly due to the free hand played by the progressive



Power Plant and Living Quarters United States Mining and Milling Company,
Atlantic City, Wyoming



United States Mining and Milling Company's Plant, Atlantic City, Wyoming

mining engineer. Despite handicaps from every conceivable quarter the Wyoming output remains stationary, while in other states sharp declines are most often noted from year to year.

METALLIC MINERALS

More work was done in 1929 toward the development of metallic mineral deposits than in any similar period since I came to the State 25 years ago.

Iron Ore

Production from the Sunrise mine totalled 639,759 gross tons. This output broke all prior records of the State. The value of this ore at the mine approximated \$2,000,000.00. During the year no exploratory or development work was done on other iron ore deposits so far unexploited in this State.

Gold

Unusual activity was resumed in the former Atlantic City Bonanza District. During the year U. S. Mining and Milling Company, Midwest Mines Corporation and the B. & H. Mining Company expended \$400,000.00 in opening former properties and in erection of new mills as well as for the installation of modern equipment in old mills. Through these efforts large bodies of pay ore were blocked out and last week the first named company reported discovery of new lead carrying extremely high gold values. Much progress has been made and work will continue full blast throughout the winter season. To handle greater tonnages than originally anticipated one of the companies announced that important extensions would be made in the spring.

Discoveries of both gold and mercury recently reported in the Lysite region attracted the attention of Casper capitalists. During the year the gravel formation was repeatedly examined by a number of mining engineers and other authorities versed on placer operations. Latest reports indicate that present holders of the properties will carry on heavy development and mining operations during coming summer season.

In the Encampment region the Divide Mining and Milling Company completed a 10-ton ball mill. Free milling ore from a 3-foot lead is now being treated and, if the recovery values continue satisfactory, other mill units will be added to the pioneer plant in the spring.

Copper

During the year development work was done on copper properties in the Lusk, Guernsey, Encampment and Centennial districts. At both Lusk and Guernsey smelter construction was started. No shipments of ore or metal were reported for the year.

Beryllium

Towards close of year this office received inquiries from research departments of widely known universities and other institutions in regard to Wyoming resources of beryllium ore. The new metal which is lighter than aluminum and stronger than steel was produced on a commercial basis for the first time this year in Germany at a selling cost of \$100.00 per pound.

Several years before beryllium attained commercial possibilities the U. S. Geological Survey mentioned in a bulletin three occurrences of beryl, the richest ore of the metal, in Wyoming. All of these are in dikes formerly worked for mica, alone, in the Hartville uplift. On the Minnie claim owned by Mr. Frederick the geological bulletin mentions that the mica dike is characterized by beryl crystals four feet long. The first company organized to exploit the metal in America addressed several inquiries to this office requesting all information available on Wyoming deposits as well as for clippings that would come to our attention on the progress made by the new metallurgical industry both here and abroad.

CERAMIC MATERIALS

The ceramic industry likewise broke all production records in 1929. Valuation of output doubled the previous total for 1928.

Cement

Increased output in ceramic materials was largely brought about by the completion of the new cement mill of the Monolith Portland Midwest Company that was formally opened in Laramie on June 22. Cost of the big modern plant was \$2,000,000.00 and during latter half of the year its capacity production of 2,000 barrels daily was shipped throughout Wyoming and to other points within its trade territory in Colorado, Nebraska and western Kansas.

The new cement mill represents the largest operation in the ceramic field so far completed in the State. For accelerating industrial development in Wyoming no pioneer

enterprise could offer more aid. For many years Wyoming had to buy all of its structural material manufactures from outside points. The new location at Laramie has put an effective quietus to a serious drain that too long sapped the strength of the financial fortress of the State.

Bentonite

Another comparatively new ceramic operation able to break all prior production records in 1929 was the bentonite industry. Greatest expansion took place in the Newcastle-Upton district. New companies entered the field and older concerns added important extensions to their plants. In September, when a visit was made to the field, 78 men were employed in the several quarries, grinding and drying plants. Since the loss of the coal industry, two years ago, the new bentonite industry has done its full share in reviving the general air of prosperity again noticeable amongst the highly versatile and many-sided business circles of Weston County.

Every year more industrial interests in the East appear to more plainly realize the fact that there is no substitute for Wyoming bentonite. For their new attitude, thanks are almost entirely due to the elaborate research departments maintained by the more progressive bentonite producers. Due to the continually increasing number of uses discovered for the new plastic clay in the industrial arts, final car-load shipments from the Newcastle-Upton district in 1929 should double the record established in preceding year.

Other Ceramic and Non-Metallic Products

Increased demands arose throughout the year for the several products from the limestone, building stone, sand and gravel quarries, brick, tile and gypsum plants located at various points in the State. Owing to the growing importance of the sugar beet industry throughout the Rocky Mountain area, added markets originate yearly for the chemical limestones of Wyoming. From six quarries, approximately 250,000 tons of limestone, worth \$375,000.00, were shipped to sugar refineries situated in Wyoming and neighboring states. For 1929, total valuation of ceramic and all other non-metallic materials produced in Wyoming will exceed \$2,000,000.00.

CHEMICAL INDUSTRY

During the year more interest was aroused in the chemical resources of Wyoming than ever before.

Welcomed inquiries were received on the character and magnitude of Wyoming deposits from foremost manufacturers and scientific institutions established in America as well as in those nations of Europe that have long led in technological advancement. As an aftermath of these activities one new chemical organization invaded the Wyoming field on a producing basis during the year; another recently announced that a progressive Wyoming city was selected for the location of its latest plant; and at present writing, this office has confidential information on a transaction now in progress with the view of acquiring title to an extensive chemical deposit located in this State.

Potash Research Progress

For stimulating the broadest interest, the Potash Research measure of Congressman Winter enacted into law in February should receive first notice. The new statute appropriated \$200,000.00 for the object of ascertaining the commercial possibilities of the potash-rich silicates in the United States. The funds so far expended have mainly been devoted to the problem of extracting potash from the rich lavas that form the Leucite Hills of Wyoming. At present two branches of the Federal Government, the Bureau of Chemistry and Soils, and the Bureau of Mines are working on the problem with growing enthusiasm. Before laboratory studies started, leading scientists from each Bureau visited this office, and thereupon, joint investigation followed in the field.

As the separation of the potash from the refractory lava is wholly an energy consuming process, each Bureau first made a careful inventory of all raw materials found in the unique local depository. On both occasions the distinguished visitors were surprised at the colossal stores of energy locked up in the promising Leucite Hills district in the form of diversified fuels as well as in hydro-electrical potential. In addition to these sources of energy, the unusually liberal supplies of fluxes, basic raw chemicals, as well as the other mineral fertilizer primaries occurring in the locality, one and all received due attention on the part of the research workers. Manifestly, if they succeed in evolving a commercial process, no possible area could surpass the extremely favorable Rock Springs district as a low cost producer.

To complete their raw materials inventories, requests for further information have been received from the co-operating investigators from time to time. As soon as the economic findings are printed, widely recognized Federal sources will for the first time circulate accurate and ex-

tremely expensive data on Wyoming's greatest chemical depository free of cost. Already, our files bear evidence of a rapidly growing interest in the research work that the two Federal Bureaus have started on the rich leucitic lavas of Wyoming. Instead of confining their investigations to mere potash extraction processes, as originally contemplated by the Act, it would appear that the present program of the Federal workers has broadened to a point that considers the economic possibilities of the Wyoming valley, not for the manufacture of a single fertilizing product, but more so for the commercial exploitation of all fertilizer salts of intrinsic value consumed by plant life.

First Phosphate Consumption

Potash was not the only chemical fertilizer that drew attention in the Wyoming field during 1929. For the first time application of mineral fertilizers were made on agricultural lands of this State. Revolutionary results were obtained in crop yields on sugar beet lands in both the Basin and Torrington districts. In the former locality the average increase in beet yields was over three tons to the acre. In the opinion of Mr. H. S. Looper, resident manager of the Great Western Sugar Company, the 1929 tests were of more importance and value to farmers than any beet demonstration train yet put on the road. Accordingly, his company has made arrangements to supply phosphate sufficient for 6,000 acres during 1930. Payment by the beetgrowers will be made at expiration of next harvest season.

Heretofore, all phosphate rock mined in Wyoming has been regularly shipped to distant California points for requisite chemical treatment. The domestic market for 1930 will doubtlessly exceed current export shipments. Incidentally, all of the phosphate now sold in Wyoming is mined in an adjoining state and shipped to a second state for conversion into soluble form. Clearly, this is an industrial anomaly that calls for rectification at an early date.

For establishing phosphate works directly within Wyoming, the rapidly expanding beet industry of entire Rocky Mountain area will exert the most effective influence. Manifestly, decision on that economic measure will be rendered by the beetgrower in lieu of the duly paid propagandist or statesman. For low cost production it is scarcely necessary to add that in the Wyoming depository also occur exhaustless stores of raw rock containing far higher phosphatic values than mineral commonly exploited elsewhere on a big scale.

Sodium Sulphate

For several years past a single concern represented by D. W. Gill of Cheyenne has been shipping sodium sulphate from Sodium, a railway station 33 miles west of Casper, sufficient to rank Wyoming as the third largest domestic producer of the salt. The 1929 shipments from this point exceeded the output of previous year.

During the year a second operation was started at a site situated 28 miles north of Rawlins. The local deposit is on lands owned by the Empire Oil and Gas Company of Casper and now leased to the Iowa Soda Products Company. Heavy carload shipments of the raw salt were made during last half of the year to the company's refinery situated in Council Bluffs. While not in a position to disclose estimates, total shipments from present operations may suffice to rate Wyoming as the largest producer of the salt in America.

Production totals will greatly expand as soon as the natural salt is taken off of the free list. Without protection, the Wyoming producer is unable to reach the domestic markets of the great consuming centers in the East that entirely rely on the duty-free imported salt as their source of supply. Fully recognizing this economic disparity, the Casper Chamber of Commerce recently petitioned the Wyoming Congressional Delegation for an adequate duty on the natural salt that occurs in exhaustless tonnages in the vicinity of their city and elsewhere in the State. The duty requested would permit shipments of the Wyoming salt to points beyond present line of demarcation formed by the Missouri River.

During the year other constructive efforts were exerted to attract chemical industries to Casper area. The selection of the city for location of a new acetylene plant was reviewed in preceding gas section.

Magnesium Sulphate

The largest known surface deposits of magnesium sulphate in United States occur in Wyoming at points close to the railroad. As yet these salts remain unexploited regardless of the fact that demands for the light weight metal from the aviation industry constantly increase from year to year.

More interest was manifested in the Wyoming deposits of the almost chemically pure salt than ever before. Field investigations were made of the leading deposits by both local and outside interests. Requests also reached this office for economic and scientific information that was far

beyond the capacity of my examination and technological departments to supply. Failure to complete a sizable hydro-electrical development is the greatest drawback against the establishment of a magnesium metallurgical operation at this time. Regardless of this adverse factor, local interests are all ready to start an industry that would merely involve the recovery and refining of magnesium sulphate for supply to drug trade.

Advertising Literature

From a tonnage classification, output of advertising literature by the office of the State Geologist, likewise, broke an all-time record during 1929. To date, shipments have been forwarded to all states as well as to all continents, save one.

On being inducted into office, consideration of Wyoming types of deposits that theretofore had been mostly ignored by both resident and non-resident savant alike was deemed equally as important as those on which able and exhaustive write-ups have long reposed in all the larger libraries of the world. After due investigation of subject, the time appeared propitious to start a broader inquiry than any then extant as to the nature and extent of the raw chemical wealth long permitted to slumber undisturbed in the Wyoming depository. Wholly in the dark as to outcome of purely speculative idea, a chance was taken, and accordingly, in the 194-page pamphlet printed in March, more stress and strain were bestowed to the Wyoming chemical deposits than all other forms of geologic materials known to occur in this State. Manifestly, for home readers this wide deviation from accepted standards of the science did not prove entirely satisfactory. On more than one occasion profuse apologies had to be extended to a worthy taxpayer for failure to include mention of his own individual mineral deposit.

Since publication, a demand of unanticipated dimension arose for the Wyoming bulletin. A short while after it was received from the printers generally favorable notices appeared in some sections of the technical press. In some journals it was erroneously accredited as containing original material. By themselves such free notices did much to broaden the demand for the Wyoming publication throughout the United States. However, for circulation in balance of world, entire credit can be extended to a widely known scientific branch of the Federal Service that had entry cards printed at the expense of the Library of Congress for free distribution among a great number of libraries, both in the United States and in foreign countries.

Obligations to Foreign Science

On the other hand, this bureau is not entirely unmindful of the aid extended to Wyoming by foreign science in the past. Among all major oil pools of the U. S. A. the Salt Creek field is unique in one respect. Unlike all others, early exploitation of the giant pool had to be financed by certain Belgium, Dutch and French sinews of war. But before those interests invested in the pioneer field it was first necessary to import into this State distinguished geological savants of those and other foreign nations largely at the private expense of the more visionary and far seeing capitalists of Wyoming. Largely due to the personal sacrifices of last named gentlemen, theories once expounded and expanded directly within the spacious outdoor Wyoming laboratory of petroliferous research now appear in the light of fundamental principles in text-books studied by schoolboys.

In course of time foreign capital may also display an interest in the chemical wealth of Wyoming. A week ago an internationally known technologist sailed for Europe with several copies of recent bulletin. In my opinion, persons not on my present payroll are best qualified to blaze the trail in this specialized field of missionary work. So long as they are willing to labor free of expense to this broadcasting bureau or to our own capitalists, it would appear that no serious harm will befall Wyoming.

Field Work

During the year many calls were received for examinations and reports on individual mineral deposits located in this State. Invariably these urgent requests had to be refused.

Among all branches of the State Government the duties of this bureau differ in one respect. It is the only department entrusted with the supervision of production operations that are conducted directly under the proprietorship of the State itself. This management and other matters wholly of a protective order are of sufficient magnitude to consume more than 80% of my annual appropriations.

Manifestly, under present set-up only limited funds are available to conduct surveys or investigations in the field regardless of how pressing the requests of certain citizens may become. Before the demands of some districts could be satisfied it would be essential to station a geologist in their respective localities all the while. Perhaps in course of time county geological agents will be found best qualified to handle these more localized forms of endeavor.

Before Wyoming, herself, entered the production field as an actual proprietor of extremely profitable mineral operations, the former State Geologists had all of their time to devote to original survey and investigational work. Since then very important studies have also been completed by the great number of Federal and private geologists who worked in the State. Already, certain technical and manufacturing groups welcome information on some types of geological deposits previously reported in this State. Unfortunately, they appear mainly interested in technological and economic issues and for that reason the mere enclosure of an isolated geological report, by itself, does not always satisfy their inquiries. If due services are to be extended to the new type of correspondents, it will be necessary to discontinue the work of both the survey and publicity departments of this bureau.

MINE PRODUCTION OF GOLD, SILVER AND COPPER IN WYOMING, 1842 TO 1929

(From statistics furnished by United States Bureau of Mines)

PERIOD	Ore	Gold		Silver		Copper		Total Value	Remarks
		Value	Quantity	Commercial Value	Quantity	Value			
	Short Tons		Fine Ounces		Pounds				
1842-1866	-----	\$ 386,100.00	3,170	4,098.00	-----	-----	-----	\$ 400,198.00	Production unknown, but very small
1867-1870	-----	400,000.00	3,240	4,115.00	-----	-----	-----	404,115.00	
1871-1880	-----	67,500.00	2,540	3,126.00	1,395.287	\$ 230,521.00	-----	301,147.00	
1881-1890	-----	131,700.00	2,400	943.00	7,541.647	1,257,649.00	-----	1,390,292.00	
1891-1900	-----	130,253.00	45,933	26,896.00	16,906.466	2,579,995.00	-----	2,736,250.00	
1901-1910	-----	59,590.00	735	384.00	130,499	16,312.00	-----	35,896.00	
1911	5,491	22,235.00	255	163.00	25,080	4,138.00	-----	26,536.00	
1912	2,483	24,184.00	957	578.00	385,239	59,712.00	-----	84,474.00	
1913	4,236	14,902.00	116	64.00	17,421	2,317.00	-----	7,387.00	
1914	4,223	14,902.00	810	425.00	447,246	78,268.00	-----	93,286.00	
1915	4,216	20,565.00	5,524	3,635.00	2,610,622	642,213.00	-----	566,414.00	
1916	8,376	3,415	3,415	2,814.00	2,027,857	553,605.00	-----	560,181.00	
1917	6,355	8,522.00	965	965.00	852,777	210,636.00	-----	212,472.00	
1918	2,870	84.00	151	189.00	139,300	26,021.00	-----	26,274.00	
1919	738	-----	-----	-----	-----	-----	-----	-----	No production
1920	50	62.00	111	111.00	10,000	1,290.00	-----	1,463.00	
1921	24	1,207.00	57	57.00	4,295	580.00	-----	1,844.00	
1922	584	296.00	254	208.00	111,280	16,358.00	-----	16,862.00	
1923	-----	-----	-----	-----	-----	-----	-----	-----	No production
1924	-----	-----	-----	-----	-----	-----	-----	-----	No production
1925	-----	-----	-----	-----	-----	-----	-----	-----	No production
1926	-----	-----	-----	-----	-----	-----	-----	-----	No production
1927	-----	1,200.00	5	3.00	-----	-----	-----	1,203.00	
1928	-----	1,577.00	53	31.00	-----	375.00	-----	1,083.00	
1929	-----	1,000.00	8	4.00	-----	757.00	-----	1,761.00	
Totals	-----	\$1,240,501.00	70,179	\$ 48,790.00	32,612,522	\$5,679,847.00	-----	\$6,969,133.00	

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PRICES OF SILVER, COPPER, LEAD AND ZINC, 1917-1929

YEAR	Silver		Copper		Lead		Zinc		Copper		Silver		Lead		Zinc	
	Per Fine Ounce	Per Pound	Per Fine Ounce	Per Pound	Per Fine Ounce	Per Pound										
1917	\$0.824	\$0.273	\$0.086	\$0.102	\$0.071	\$0.086	\$0.102	-----	-----	-----	-----	-----	-----	-----	-----	-----
1918	1.00	.247	.071	.091	.071	.086	.091	-----	-----	-----	-----	-----	-----	-----	-----	-----
1919	1.12	.186	.053	.073	.073	.053	.073	-----	-----	-----	-----	-----	-----	-----	-----	-----
1920	1.00	.184	.080	.081	.080	.080	.081	-----	-----	-----	-----	-----	-----	-----	-----	-----
1921	1.00	.129	.045	.050	.045	.045	.050	-----	-----	-----	-----	-----	-----	-----	-----	-----
1922	1.00	.135	.055	.057	.055	.055	.057	-----	-----	-----	-----	-----	-----	-----	-----	-----
1923	.82	.147	.070	.068	.070	.070	.068	-----	-----	-----	-----	-----	-----	-----	-----	-----
1917	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1918	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1919	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1920	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1921	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1922	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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1927	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1928	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1929	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Totals	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

The value of metal production herein reported has been calculated at the figures given in the foregoing table. Gold is figured at the mint value for fine gold; that is, \$20.671835 an ounce. The silver prices for 1917 and 1919 are dealers' buying prices, New York; for 1918, average price as stated by the Bureau of the Mint; for 1920 to 1922, New York market price for domestic silver only; for 1923, average price under the Pittman Act, from January 1 to June 2, for domestic silver, and average New York price for all silver after that period; for 1924 and later years, average New York price for bar silver; prices shown for 1928 and 1929 are computed on gross value of gross production as reported.

The copper, lead, and zinc prices are weighted averages, for each year, of all grades of primary metal sold by producers.

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MINERAL PRODUCTION OF WYOMING

PRODUCT	1928			1929		
	Quantity	Unit	Valuation	Quantity	Unit	Valuation
Asphalt	35,442	Tons	\$ 354,420.00	35,831	Tons	\$ 358,310.00
Bentonite	15,575	Tons	47,192.00	30,918	Tons	84,300.00
Clay, raw	18,312	Tons	9,156.00	23,968	Tons	11,282.00
*Coal	6,571,683	Tons	17,363,000.00	6,704,763	Tons	17,052,000.00
Crushed Rock, Sand, Gravel and Bldg. Stone	3,322,805	Tons	581,383.00	3,854,163	Tons	673,661.00
Gypsum	26,815	Tons	8,142.00	29,273	Tons	8,134.00
Iron Ore	560,241	Tons	1,397,610.00	713,273	Tons	1,819,181.00
Limestone	209,980	Tons	397,717.00	333,302	Tons	631,363.00
Natural Gas (4c per thousand cubic feet)	47,051,388.700	Cubic Feet	1,882,955.00	48,704,363,065	Cubic Feet	1,743,166.00
Natural Gasoline	46,050,084	Gallons	3,353,756.00	19,293,097	Gallons	3,449,957.00
*Petroleum	21,461,000	Barrels	27,400,000.00	19,314,000	Barrels	24,700,000.00
Paint Iron Ore, Phosphate and Sodium Sulphate	8,995	Tons	19,130.00	10,080	Tons	21,790.00
Total valuations, eliminating duplications			\$52,813,561.00			\$50,557,144.00

*U. S. Bureau of Mines figures.

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CHAPTER VII

**SUPPLEMENTAL REPORT ON THE SUPREMACY OF
SOUTHWESTERN WYOMING AS A SITE FOR
LARGE-SCALE CHEMICAL OPERATIONS**

Since the publication of our Bulletin No. 21—"Developed and Undeveloped Mineral Resources of Wyoming", which aroused considerable interest both here and abroad, many requests have been and are being received for more recent information on certain types of mineral deposition, bibliographical references, chemical analyses, maps of the chemical deposits, as well as for information on local market demands for products that could be made directly in Wyoming.

To partially satisfy the demand mentioned above, the following supplemental report is submitted:

New Railroad Booklet

Since the State bulletin was issued, the Union Pacific Railroad published its Industrial Circular No. 3, under title of "Fuel and Raw Material Resources of Wyoming Tributary to Union Pacific System."

The railroad publication provides information on some of the items omitted in the State bulletin. Its 20 pages record analyses of the major chemical and fuel deposits described in the late Wyoming bulletin. Moreover, the margins on its pages left room for the insertion of the main bibliographical references available on those deposits of sundry fuels, raw chemicals and complete mineral fertilizers that are located on the railroad in southwestern Wyoming. Should the reader desire additional information on a particular deposit, reference should be made to the bibliographical notations now inserted in the supplementary bulletin of the railroad company on file in the office of the State Geologist and which will soon be published by this department.

Map

The printing of a Wyoming map that would show the locations of all the chemical, mineral and fuel deposits is a procedure far too costly for the bureau to finance at this time. A map of Wyoming, however, appears on inside cover of the railroad booklet.

Unfortunately, the chart only shows the locations of the oil and gas fields as well as the boundaries of the vast coal basins situated in this State. Accordingly, for this report the locations of the principal phosphate, potash and

nitrogenous beds as well as the deposits of salines, alkalis and other chemicals and minerals are superimposed on the fuel map of Wyoming as published by the railroad company.

Complete Depository of Fertilizing Minerals

A glance at the map shows that huge deposits of phosphate, potash and nitrogen bearing minerals all occur within the extremely favored southwestern Wyoming area. Outside of Wyoming an occurrence of all three of the major mineral elements consumed by plant life is unknown within a single locality. As a rule such vital materials are found at widely separated points. In Wyoming all occur on top of the greatest coal basin known to the nation. Later, it will be pointed out that the direct association of all three fertilizing minerals with every sort of fuel supply is an unsurpassable economic factor in the manufacture of super-strength, triple salts at lowest possible cost.

Other Raw Chemicals

Moreover, atop of the great basin of assorted fuels also occur large deposits of important saline and alkali compounds some of which can be locally utilized in the production of fertilizing salts. Take for instance, sodium carbonate, which is second only to sulphuric acid in production importance in this country. At Green River City large beds of the natural salt underlie the city at shallow depths. At that division point for two leading railway lines the manufacturer can set up his plant on top of those largest deposits of America's second most useful chemical compound. For maps and authentic descriptions of this and other Wyoming deposits of raw chemicals the reader is respectfully referred to the bibliography cited on page 19 of the railroad circular. More extended descriptions of these salts as well as on the Wyoming triumvirate of fertilizing minerals likewise appear in the state bulletin published a year ago.

Low Cost Acid Supply

Another economic factor not yet mentioned in existing publications is the accessibility of southwestern Wyoming to low cost acid supply. The proximity of this region to the Great Salt Lake in Utah is described on the page that is inserted on back inside cover of the railroad circular. As cited thereon, the huge copper smelters now operating in that district could soon supply all acid demands that may originate in the adjoining Wyoming area at an exceptionally low cost.

Potash Research Progress

The potash deposits of southwestern Wyoming all occur in an immense flow of leucite lava. Its average potash content of 10% is the highest reported in leucite rock.

During 1929 two Federal bureaus started to expend the sum of \$200,000.00 with the view of devising means to extract the potash content on a commercial basis. As the solution will involve an energy consuming process all agree that the local chemical and dynamical laboratory offers the greatest promise for the exploitation of rich potash silicates in a successful manner.

Diversified Solid Fuels

On before mentioned railroad map the Wyoming coal basins appear in dark horizontal line shadings. A glance at the map discloses that fully 80% of the 25,000 square miles, that comprises southwestern Wyoming, is one huge coal field.

Elsewhere coal basins of this magnitude do not exist. Conservative estimates of geologists already place its solid fuel content at 665 billion tons. However, space on the map only permitted the location of a seam 85 feet thick as well as a horizontal bed 30 feet thick suitable for low cost stripping operations, and also, the famous bone coal seam 8 feet thick that contains 2.3% ammonia alum. Should the latter bed ever show good fuel values, it may also serve as the natural source of supply for combined nitrogen in the district.

Airport Rock Springs, located 15 miles east of Green River, is the Coal Capitol of the Rockies. Its chief claim to fame rests on its ability to mine coal at continually decreasing costs. At present 55% of total output is from mines completely mechanized, and engineers estimate that within five years all the coal of the district will be mined and loaded wholly by literally laborless mechanical operations. Largely due to this spirit of progress, the President of the Union Pacific Coal Company stated in January, 1930, that for its size, population 10,000, Rock Springs is now the most prosperous city in the United States.

Liquid and Gaseous Fuels

A glance at the map further reveals that nearly all important points in southwestern Wyoming are already connected with oil and gas lines.

At Rock Springs is the Baxter Basin Gas field. Last September this huge reservoir and two smaller fields of the locality were connected with Salt Lake and other im-

portant Utah cities by a 334-mile pipeline system that cost \$18,000,000.00 to complete. On the map this new network, that now extends across the natural Wyoming laboratory, is plotted in red.

Included in the exhibits are two recent newspaper clippings. One of these shows that Idaho municipalities are now protesting the entrance of this cheap gas supply into their state. The other reports a movement now on foot to pipe the Wyoming gas to distant metropolises in the Pacific Northwest. In my opinion, much of this efficient fuel of twice the calorific value of best artificial gases should remain for future industrial expansion directly within the combined chemical laboratory and power house that so largely goes to form southwestern Wyoming as a whole.

In modern industry the use of gas is constantly playing a more important role. Elsewhere gas wells already supply large chemical works with the basic hydrocarbon molecules from which a wide range of costly organic compounds are built up when united with acetylene. Some of these new synthetics include the latest solvents used in major industries as well as the newest motor coolants and also acetone, the foundation of the present rayon industry. Already an acetylene plant is being built in Wyoming to utilize cheap gas in the manner described.

On the other hand, in addition to its ability to synthesize with other radicles, it now appears that even more powerful forces can be yielded from natural gas, itself, when its molecules are broken down into simpler units. In this connection the following extract is taken from page 656 of the November, 1929 issue of "Chem. and Met.":

"Now, however, there looms on the horizon the possibility of a more efficient exploitation in which natural gas becomes the raw material for large-scale chemical synthesis. By a simple cracking process the methane will yield hydrogen and ethylene. The latter may some day serve as the basis for producing synthetic acetic acid or even ethyl alcohol. Hydrogen is the more costly of the raw materials for ammonia synthesis, and it is reported that the German nitrogen industry plans to establish a plant in the Monroe area to take full advantage of this economical source."

For producing hydrogen under the proposed less expensive process it is doubtful if any region should attract more attention than the extremely favored southwestern Wyoming area. In addition to lowest cost gas supply, the local chemical and dynamical laboratory also offers huge deposits of high grade phosphate beds and rich potash lavas that could be directly combined with hydrogen-made ammonia for the manufacture of the more powerful fertilizing salts. Obviously, the ideal mosaic that is southwestern

Wyoming will soon attract the more progressive chemical industries. As matters now stand even the largest of present organizations would likely be lost in the immensity of the local caldron.

Hydro-Electrical Resources

On before mentioned map a hydro-electrical site is also plotted directly on the Green River. According to United States Geological Survey Water Supply Bulletin No. 469, this site is situated in Utah, eight miles south of the Wyoming boundary. From the central railway and industrial city on the Green River in Wyoming the distance to the proposed site is 44 miles. When completed, the backwater will extend over this entire distance in Wyoming.

In regard to the site the following extract is taken from the Federal publication:

"The Flaming Gorge power site is at the dam site for the Flaming Gorge reservoir, in northeastern Utah. The elevation of the low-water level of Green River at the dam site in Horseshoe Canyon is 5,825 feet. By constructing a dam to elevation of 6,050 for storing to elevation 6,040 feet, the reservoir capacity would be 3,130,000 acre-feet. The storage capacity between the 6,000 and 6,040 foot contours would be 1,210,000 acre-feet, or sufficient to equalize the flow of the river at this point and insure a minimum flow of 2,700 second-feet. By constructing a 3-mile tunnel at elevation 6,000 feet an effective head of about 290 feet could be obtained. With a head of 290 feet and a flow of 2,700 second-feet, 71,000 brake horsepower could be developed."

A view to the entrance of this famous gorge appears in Vol. II in King's Geological Survey of the 40th Parallel. Due to the precipitous slopes of the rock-ribbed box canyon site, cost of development would be comparatively low. Moreover, when Wyoming and Utah entered the Colorado River Compact of the government, it was generally understood that the development of the local site would be one of the first improvements completed on the great interstate river system. As soon as sizable industrial demands for power originate in the locality, sentiment for the development of the big hydro project will likely be expressed in this State.

To some engineers a hydro-site of preceding magnitude directly within the heart of the Wyoming Wonder Valley is merely looked upon in the light of surplus baggage. It is admitted that on completion the proposed hydro-plant would meet an extremely stiff form of competition. For directly within the natural power house of Wyoming are also an overlapping series of colossal coal seams as well as the largest reservoir of natural gas of high calorific value known in the entire Rocky Mountain region. From

this huge bin of diversified fuels limitless supplies of steam could likewise be produced at the lowest possible cost. Manifestly, the Wyoming valley can offer little inducement for private capital to construct a superfluous hydro plant therein. However, as soon as Federal agencies complete this development, primarily for dual irrigation and flood control measures, the far-seeing industrialist already established in the local laboratory would be first to reap the advantages of the lower power rate so provided.

Herein, mention of the big hydro site was only made to show that within the matchless Wyoming area not one but every method will be open for the progressive concern to make complete and concentrated fertilizer products. If ordinary soluble treatment is objectionable, perhaps the huge beds of 80% tri-calcium phosphate of the district could best be volatilized to pure acid form by the patented electro-thermal method now operating in Alabama in a big way. If either the mining of the ammonium coated coals or the production of hydrogen by natural gas dissociation should likewise prove disappointing, the versatile manufacturer could still resort to the old-style fixation process for his nitrate requirements.

Accessibility

From correspondence recently received, an impression seems to prevail that the southwestern Wyoming valley is a part of one of the more remote, isolated and backward localities of America. Nothing could be further from the truth. As a matter of fact, the district is traversed from end to end by the Main Street of the Nation.

From Pony Express days to mail by airplane, the central arterial route of the Green River valley was always selected for every style of communication first inaugurated from coast-to-coast. Other types of "first and best" transcontinental services are now provided by the Union Pacific main line, the Lincoln Highway, as well as by the main trunk lines of the telephone and telegraph companies.

At present, Airport Rock Springs, the most progressive city of the valley, is distant 20 hours from New York and 10 hours to the largest Pacific Coast seaports. Already, twice daily service is provided in each direction over this pioneer air route of the nation. Moreover, to take care of continually increasing traffic demands, extra passenger service will be added to this shortest and most direct airline.

LOCAL MARKET DEMANDS

Another omission in Bulletin No. XXI was failure to include a survey of immediate market demands for mineral fertilizer products directly within Wyoming as well as in all the states that form its boundaries.

A year ago, when publication was received from the press, it was still generally contended that with the possible exception of nitrates, the comparatively new soils of the Rocky Mountain region still contained their original rich contents of fertilization minerals. Exhaustive studies and tests conducted by the progressive sugar beet industry during the past summer conclusively demonstrated serious deficiencies of phosphate minerals in agricultural lands that have long passed as the pride of Wyoming. Since then the leaders in the sugar industry lost no time in performing similar tests in the adjoining states. According to their latest findings an annual expenditure of \$3.00 per acre in phosphates will return the grower as high as \$30.00 extra in beets not only in Wyoming but also in all adjoining states in which is confined the entire sugar beet industry of the Rocky Mountain region.

Naturally, the highly important economic discoveries of the beet industry have already been duly broadcasted in the Press. In the jacket attached to the railroad booklet heretofore mentioned are a considerable number of clippings selected from leading newspapers. Space within this report will not permit an adequate digest of the divers messages conveyed by those clippings. However, should they fall within the hands of a manufacturer of fertilizers, long compelled to deal with rather skeptical schools of agriculturists, he will have good reason to observe a far more intelligent degree of receptivity already awaiting products of proven merit directly within the up-and-coming Rocky Mountain area.

A Modern Agricultural Industry

The Rocky Mountain beet sugar industry is a new enterprise and as such its open-minded devotees are not overburdened with matters relating to long established traditional policies. The type of clippings selected for the enclosure plainly discloses that in this area the refining interests, in lieu of the fertilizer manufacturer, performs the work of breaking down the sales resistance offered on the part of the grower. As an example, the most recent clipping from the Denver Post (Feb. 9, 1930), tells about the "Dynamic Mass Meetings" that a leading sugar company is now sponsoring in 65 different Wyoming, Colorado

and Nebraska towns for the object of driving home the idea of using phosphates on beet lands that lay tributary to its numerous refinery sites.

In the last decade other missionary work performed by the costly demonstration trains of the progressive refining company increased the beet yield 2.3 tons per acre throughout its extensive territory. Without the use of phosphates and other fertilizers the Rocky Mountain beet yield is already three tons per acre higher than that of the balance of the nation. With the use of phosphates alone the refiners hope to step up present 12-ton yield to 16 tons per acre during coming summer season. At \$3.00 per acre that desideratum would involve an investment of over \$1,300,000.00 in phosphate for this year. In addition to Wyoming, Colorado and Nebraska, another clipping shows that a second large sugar refiner is also preaching the 16-ton per acre doctrine for this season in the heavy producing states of Utah and Idaho.

Sales Plan

At places the financing of fertilizer sales on long term installment plans appears to work a hardship on the manufacturer. Apparently, in the select Rocky Mountain area such unsound practices are entirely obviated. One of the clipping enclosures describes the sales plan now in vogue. In short, out here the refining interests buy phosphate in the spring and supply it direct to the grower who makes payment when the beets are sold to the company in the following fall. Manifestly, this new western procedure is far less complicated than practices that may still prevail in either the less organized or the more generalized styles of agricultural communities.

Relative Importance of Rocky Mountain District

The following tables disclose the importance of the Rocky Mountain district in comparison to the entire beet industry of the Nation:

AMERICAN SUGAR BEET INDUSTRY

Acreage and Production Statistics as Recorded by Table 310 on Page 875 of 1928 Yearbook of U. S. Department of Agriculture

Table I Rocky Mountain District for 1928			Table II All Remaining States for 1928		
State	Acres	Production	State	Acres	Production
Nebraska	88,000	1,023,000 Tons	Ohio	38,000	281,000 Tons
Montana	29,000	262,000 Tons	Michigan	65,000	428,000 Tons
Wyoming	45,000	487,000 Tons	Wisconsin	8,000	74,000 Tons
Idaho	26,000	285,000 Tons	California	52,000	635,000 Tons
Colorado	179,000	2,322,000 Tons	"Other States"	67,000	562,000 Tons
Utah	53,000	623,000 Tons			
*South Dakota	6,000	60,000 Tons			
Totals	426,000	5,062,000 Tons	Totals	220,000	1,978,000 Tons

*Totals included under "Other States" in Yearbook.
Rocky Mountain Acreage—66% National Acreage.
Rocky Mountain Production—72% National Production.

When 1930 figures are available the 72% production of national total recently accredited to Rocky Mountain district will be greatly augmented by application of phosphate and other advanced practices. No other climate is better adapted for growing sugar beets than that of the highland plains which surround the Rockies. At present no agricultural industry is in more wide awake hands or is controlled on a more scientific basis than the beet industry of the Rocky Mountain states. For these and other reasons some local optimists already predict that the day will soon be here when the production percentage rating of the Rocky Mountain beet industry will approach the parity long enjoyed by the cotton industry of the South.

Huge Totals Paid for Beets

One of the clippings selected for the enclosure stresses the fact that the pioneer refining company operating in Wyoming, Colorado, Nebraska and Montana celebrated its twenty-fifth anniversary in January, 1930. During the ceremonies an executive announced that his company had already paid the sum of \$377,658,687.00 to the growers of sugar beets in four states mentioned. Manifestly, single clients of the preceding girth do not loom above the horizon of the chemical world on every day of the week.

Map of Sugar Beet Industry

On outside cover of page of railway circular is a map on which the area of the Rocky Mountain sugar beet industry could be superimposed for this report. Thereon,

the locations of the 55 sugar refineries now operating in entire district are inked in red.

A glance at the map suffices to disclose that the area of the Rocky Mountain beet industry is confined wholly to Wyoming and to each one of the six states that form its complete boundaries. As now established, Wyoming is thus correctly plotted as the "Heart" state for the comparatively new industry.

For the map, a 350-mile radius circle was plotted from the central point of Green River City, Wyoming. Within this selected radius is confined all of Wyoming, and also, 52 of the 55 sugar refineries operating in entire Rocky Mountain region.

From the mentioned focal point an inner circle of 75-mile radius was also plotted. This inner circle delimits the outer boundaries of the vast chemical and dynamical laboratory of Wyoming in which is compacted its greatest basin of diversified fuels, its largest hydro-site, and also, all of its potash lavas, its high-analysis ammonium coals as well as a large share of its enormous stores of rich phosphate rocks. Moreover, as indicated on the map, the huge laboratory, in which is stocked all raw materials and ingredients that enter into the manufacture of all dynamic foods consumed by plant life, happens to be strategically located in the geometric center of the great Rocky Mountain beet industry firmly delimited and established by this day.

Other Market Outlets

By itself the entire beet industry can only make slight drafts on the enormous supplies of vitalizing forces still reposing undisturbed within the consummate and inimitable storehouse of plant foods that is centrally located in Wyoming. For other agricultural pursuits the Wyoming depository likewise occupies an advantageous location of some importance. For the 15 years last past shipments of raw phosphate rock have been annually made from the Wyoming district to the citrus lands in California. Had the phosphates been shipped in costly soluble form, the deliveries to those distant points could have been expanded many times.

Directly bounding and overlapping the Rocky Mountain beet industry are other forms of agricultural endeavor that now rest on solid economic foundations. The new cotton industry of the West is now established in Arizona and New Mexico, the two states that form the southern boundary of local beet industry. For those highly productive areas as well as some cotton lands in both Texas and Oklahoma, the Wyoming depository should logically develop into

the most accessible source of supply for high-analysis plant-food concentrates.

In Federal Statistical Reviews, Nebraska and South Dakota are classified as a component part of the Rocky Mountain Sugar Beet District. On other agricultural atlases those two great commonwealths always appear in that group of 13 upper Mississippi Valley states that bear the label—"The Breadbasket of America."

Just how soon the wheat and corn growers within the two states that form the eastern boundary of Wyoming will see the light in applying labor saving mineral foods on their lands is manifestly an economic issue on which no forecast can be filed by this bureau. However, should demands originate in the wide enveloping grain belt with the Wyoming degree of unexpected suddenness, due thanks would have to go to the phosphate deficiency discoveries of scientists employed by the modern beet sugar industry that is now so firmly entrenched in its incomparable Rocky Mountain stronghold.

Conclusion

The manufacturer of phosphates who first sets up a works inside of the huge natural laboratory of Wyoming will find local markets awaiting the products of his plant in every cardinal direction. Should higher power salts be made at that central focal point, the open territory would now embrace the greater half of the United States.

CHAPTER VIII

PHOSPHATE BEDS IN WEST CENTRAL WYOMING

Wyoming Phosphate Beds Offer a Basis for Important Industry

The existence of vast beds of phosphate lying across the west central part of Wyoming presents another important link in the chain of industrial possibilities for the state since phosphates have proven to be a necessary and valuable factor in the expansion of manufacturing enterprises.

Geology

Like the deposits at Cokeville, the phosphates of central Wyoming occur in the Phosphoria geologic formation. Maps of this formation appear in Bulletin No. 795 and Professional Paper No. 120, two publications of the United

States Geological Survey. In the Wind River Canyon, situated a few miles south of Thermopolis, the tracks of the Burlington Railroad are shown to cross the Phosphoria formation. As yet, the Survey has published no reports of the phosphate possibilities of the Wind River Canyon area. Moreover, no prospector has reported the discovery of phosphate beds in that particular locality.

The only phosphate deposits of central Wyoming, covered by a report of the United States Geological Survey, are those situated near Lander. In their Bulletin No. 764, published in 1924, under title "Phosphate Deposits in the Wind River Mountains near Lander, Wyoming", a wealth of detailed information is plotted and recorded on the mentioned phosphate resources.

On page 34, the Survey tabulates eight different sites where the character of the upper phosphate bed in the Lander vicinity is most favorably developed. As their table shows the thickness of the bed in the several sites as well as its tricalcium phosphate content, a copy thereof is inserted below:

Locality	Miles from Lander	Thickness (inches)	Tricalcium Phosphate content (per cent)
No. 1 Baldwin Creek, Sec. 18-33-101	6	27	35.3
No. 2 Squaw Creek, Sec. 29-33-101	5	39	41.0
No. 3 Sec. 5, T. 32 N., R. 100 W.	5	42	43.2
No. 4 Middle Fork of Popo Agie R. Sec. 8-32-100	6	42	42.0
No. 5 Sec. 27, T. 32 N., R. 100 W.	8	72	43.4
No. 6 Sec. 25, T. 32 N., R. 100 W.	8	60	49.2
No. 7 Little Popo Agie River, Sec. 8-31-99	11	86	35.5
No. 8 Sec. 33, T. 31 N., R. 99 W.	15	38	36.8

In the preceding copy a column was added that shows the distance of the listed sites from the city of Lander. Lander is the extreme western terminal of the Chicago and Northwestern Railway and the preceding table shows the most favorable phosphate outcrops geologized by the Survey to be from 5 to 15 miles distant from the Lander railway terminal. All of the eight listed sites are west and southwest of Lander. They are situated at the mouths of canyons of the high Wind River Range, at an average elevation of 6,000 feet. From those points the extremely fertile and prosperous Lander agricultural valley slopes gradually to the city, the elevation of which is 5,372 feet. Over this favorable down-grade terrain short railway branches could be constructed at favorable costs.

At the present time the largest phosphate operation conducted in the Rocky Mountain area is that of the Anaconda Copper Company, situated at Conda, Idaho, some 50

miles west of the Wyoming state line. To reach their deposit, the company constructed a nine mile branch railway from Soda Springs on the Oregon Short Line. At present phosphate rock is being mined at only two other localities in the West. They are situated at Montpelier, Idaho, and at Cokeville, Wyoming, or two points located close to the operations of the Anaconda Company.

In the length of this report, it would be impossible to copy the descriptions of the Survey for each of the eight sites that they listed. On page 24 of the Government report the following statement is made in regard to the No. 6 listing of the preceding table:

"Exposures in Sec. 25 probably represent the upper bed at its best in the Wind River Mountains It ranges from 3½ feet to six feet in thickness and is thickest in the southeast part of the township in Sec. 25, where it is also the richest, carrying 49.2 per cent of tricalcium phosphate compared with only 43.2 per cent in Sec. 5."

At the favorable point described, the Survey measured a complete geological section. The complete section follows below:

Section of Phosphoria formation on North Fork of Willow Creek		Ft.	in.
Limestone, massive, gray, fossiliferous	-----	27	6
Shale, cherty in upper part, and nodular; surface resembles pebble dash	-----	22	
Phosphate bed, oolitic (about 32 per cent of tricalcium phosphate)	-----		7½
Shale, bluish drab, slightly phosphatic	-----		10
Chert	-----		7
Shale, bluish drab	-----		3
Phosphate (approximately 32 per cent of tricalcium phosphate)	-----		9
Shale, bluish black, with phosphatic bands; weathered surface coated with blue film, especially in upper part of shale	-----	18	
Phosphate, upper 4 feet friable, lower 2 feet more resistant; near base are fish teeth and other fossils (43.4 per cent of tricalcium phosphate)	-----		6
Limestone, gray; upper part fossiliferous	-----		19
Interval, not examined in detail, mostly shaly limestone	-----	120	
Limestone, gray, massive, rich in fossils; Allerisma plentiful	-----		20
Shale, greenish	-----		4
Phosphate bed having many Lingulidiscina and made up of phosphatic bands, intercalated with lean phosphatic limestone (44.7 per cent of tricalcium phosphate)	-----		2 9
Limestone, compact, dark gray, siliceous, fossiliferous, with covered interval below	-----		40
Tensleep sandstone, unmeasured.	-----		

As elsewhere in the region, please note that the phosphate occurs in the form of two beds separated by a 174-foot vertical interval. This interval is mostly shaly lime-

stone and, as further stated by the Survey, it was not examined in detail. As the notes of the Survey also record the character of the phosphate rock beds, no further descriptions of them will appear herein.

Mining

In their valued report, the Survey offers no suggestions as to the manner that the phosphate rocks of the Lander locality could be most economically mined. The dip of the upper bed in preceding section is recorded as 8 degrees-12 degrees NE. In that comparatively mild dip it is possible that a considerable quantity of the five foot thick phosphate bed could be recovered by stripping operations.

To comment on this matter would obviously require a personal investigation in the field.

Technology

Like all phosphate rock mined in America and Africa, the Lander deposits occur in the insoluble form. To render the phosphate in the form assimilable by plant life, the rock is generally dissolved in sulphuric acid. This process is known as the acid treatment. Ordinarily, to treat a ton of phosphate rock, a ton of sulphuric acid is required.

In their bulletin the Survey made mention of the fact that the Lander deposits are quite remote from present sources of low-cost acid supply. The nearest sources of supply were described as the smelter sites at Butte and Salt Lake City. At the present time no nearer sources of supply are available for the Lander district.

In view of the preceding unfavorable factor, the Survey suggested a cheaper experimental process in which the ground phosphate rock would be heated to 600 degrees-700 degrees C., with a mixture of calcium, magnesium and sodium carbonates. While all three of the latter raw materials are known to occur at nearby points, I regret my inability to cite an operation that now uses the suggested process of the Survey for the object of converting phosphate rock to the soluble form.

Since the publication of the Survey bulletin six years ago, an electro-thermal process has been developed for the successful treatment of raw phosphate rock. At present the patents are held by the Federal Phosphate Company and at their plant in Anniston, Alabama, Tennessee rock is reduced to acid form in a big way. In the process a charge of phosphate rock is mixed with coke and nearly pure quartz sand is placed around the principal electrodes

of the furnace. Sufficient air is admitted to the furnace to burn the freed phosphorous to phosphorous pentoxide. Batteries of these furnaces are operated together and the resulting fumes pass through cooling batteries to Cottrell precipitators. The product is recovered as a highly pure liquid phosphoric acid, from which a number of commercial fertilizers can be manufactured in the form of highly concentrated salts. Manifestly, the success of this process is largely dependent on a cheap supply of electric current.

Within the past year, the Atlantic Power Corporation, the address of which is 910, 17th St., N. W., Washington, D. C., obtained a permit to construct a power development from an effective head of 672 feet on Louis Creek. The proposed site will develop 2,900 horse power at a cost of \$235,000. The plans call for the construction of a power house in the SW $\frac{1}{4}$ SW $\frac{1}{4}$ of Sec. 28, T. 31 N., R. 100 W. The latter point is situated but six miles southwest of the principal phosphate bed hereinbefore described. Construction of the extremely favorable development has been delayed on account of prospective markets for current. Development of the phosphate deposits in the locality would consume the last kilowatt of energy that the proposed plant could produce. In order to construct their project, the Atlantic Power Corporation would be pleased to correspond with chemical organizations interested in the purchase of current for the manufacture of phosphates by the modern electro-thermal process.

Some years ago, Mr. John T. Clark and associates of New York City completed the Boysen Dam on the Wind River at a point situated 50 miles northeast of the phosphate deposits. As yet, no market has arisen for this cheap power development. Present installations in the power house will develop 1500 horsepower all of the time. Additional equipment could be installed for developing extra power during the more favorable discharge periods of the year. As Mr. Clark is now very anxious to make contracts for power, it is suggested that anyone interested correspond direct with him at his address, c/o The Barclay, 111 East 48th Street, New York, N. Y.

In course of time larger power developments will be completed in the vicinity of the phosphate deposits. Several years ago one of the most widely known firms of engineering bankers filed a very favorable report on the Seminole Mountain power site, situated some 90 miles east of the Lander phosphates. When completed, 66,000 horse power will be available the year around at the Seminole site. Construction of this favorable project has also been delayed

on account of present markets for power outlets in this State.

In recent years considerable progress has been made on the recovery of phosphate by the fuel furnace process. This process does not involve the use of electric current. For heating agents both coke and fuel oil have been used. At a recent convention of chemists, the new fuel furnace process was held to be cheaper than the electric process. The firm most interested in the development of the fuel furnace process appears to be the Coronet Phosphate Company, whose address is 99 John Street, New York City. Industrial agents of railroad companies interested in the establishment of a phosphate industry in Wyoming that does not involve the consumption of sulphuric acid, should write to both of the modern phosphate companies hereinbefore cited.

Markets

At present only one works for the manufacture of soluble phosphates is established west of the Mississippi River. This plant is located at Butte, Montana, and for its operation phosphate rock of Idaho is used. Manifestly, as soon as a plant is established in Wyoming the grower will pay decidedly less for his phosphates.

At the present time the Rocky Mountain region produces 72 per cent of the sugar beets grown in the United States. This region is entirely confined to Wyoming and all of the six states that form its boundaries. Due to the increased protection allowed by the new tariff act, far greater acreages of sugar beets will be planted in the extremely favorable Rocky Mountain region.

The states that lead in sugar production are Colorado and Nebraska. Should a phosphate plant be established at Lander, it would be located over 400 miles closer to Colorado and Nebraska markets than the present Montana source of supply. The Lander deposits are also situated far nearer to the 13 upper Mississippi valley states that commonly bear the label "The Breadbasket of America."

Other Technological and Economic Conclusions

The transformation of raw phosphate rock to the soluble form assimilated by plant life involves the expenditure of considerable forces largely in the way of chemical or thermal energies. For that purpose, remarks in this report have so far been confined to mention of the hydro-electrical resources that remain largely undeveloped within the Lander phosphate area.

Heretofore, mention was also made of some fuel processes that consume coke and fuel oil as heating agents in the manufacture of soluble phosphates. In the way of diversified fuels the local region is a complete depository.

Several years ago the City of Lander was connected by pipeline with one of the largest natural gas reservoirs in the State. The calorific value of this cheap gaseous fuel is fully twice as high as the best artificial products made elsewhere.

For recovery processes that involve fuel oil, mention may here be made of the Lander Oil Field. Part of this important oil field is located within the incorporated limits of Lander, itself. In that convenient position adequate supplies of high-power black oil could be provided at lowest quotations prevailing in the national market.

Ten miles east of Lander is Hudson, an important coal mining camp. As these mines are electrically operated and completely mechanized, production costs at the site are far below the average. As yet much research work remains to be done on the determination of the coking and briquetting values of the local seams.

In the Government bulletin hereinbefore referred to, a chemico-thermal process, involving the use of calcium, magnesium and sodium carbonates, was suggested as a possible substitute for acid treatment in the recovery of local phosphate values. Should that highly specialized process prove feasible, the dolomitic ledges and soda lakes of the county would readily supply all three of the raw materials above listed.

Since publication of the Government bulletin, private and Federal research workers have made notable progress within the field of phosphate technology. As yet, none of the technologists attached to my staff have made visits to plants in which the newer processes are commercially exploited. Largely for that reason no suggestions could appear herein on the process that will prove most feasible for the development of the Lander phosphate deposits. Manifestly, early solution of this problem will be mostly dependent on the continued demands for phosphates that so recently became widespread in this State.

At present, western phosphates are only mined on the west slope of the Rocky Mountain barrier. So far, those points have proven far too distant to reach the great agricultural markets of the East. In their unique position directly within the Mississippi valley, immense areas of America's greatest and richest agricultural belt are located nearer to the Lander deposits than all other sources of phosphate supply now known to the nation. In course of

time the economic advantages of operating a phosphate plant on the nearer, down-grade side of the Rockies will be more closely investigated.

On boundaries already quite closely delimited, Wyoming is the "Heart State" for the new, highly progressive and rapidly growing Rocky Mountain sugar beet industry. Logically, upon this key area both private and public scientific agencies will continue to concentrate their original soil investigational work.

Due to research labors recently performed by a leading sugar beet company in Wyoming, a broad demand for super-phosphates has suddenly arisen in this and adjoining states during the present planting season. Sight of these new demands can no longer be ignored by the more progressive chemical manufacturer. As developments now stand, the manufacturer who first sets up a phosphate plant at Lander will find a highly intelligent and surprisingly receptive home market already established for his product directly within Wyoming, itself.

CHAPTER IX

NEW INDUSTRIES IN WYOMING

Hydrogen Sulphide Gas May Be in Demand for Manufacture of Germicides.

From inquiries received by this department, the rotten egg (hydrogen sulphide) gas of the Byron and Baxter Basin fields of Wyoming may be in demand for the manufacture of hi-powered cleansing soap and germicides. Natural gas containing hydrogen sulphide (H₂S) is poisonous and has to be treated before it can be used for domestic fuel.

Oil and gas well drillers dislike to work on a well making hydrogen sulphide gas in appreciable quantities. It is injurious to the eyes and gives the men working around it what is called "gas eye." In many instances it has proved fatal where workmen have been trapped in tanks or in cellars of drilling rigs or even when working in other capacities around where there is a considerable quantity of the gas. The presence of the gas is easily detected because of an odor like "rotten eggs."

Ideal Conditions

It will be a source of gratification to oil and gas operators to know that this kind of gas may soon be in great

demand. Not only has this Department received inquiries about hydrogen sulphide gas, but representatives of at least two large soap and germicide manufacturers have been in the state recently investigating the properties of natural gas from both the Byron and Baxter Basin fields. A decided advantage for manufacturers planning to make the new high-grade soap from Wyoming gas is the presence of practically an unlimited quantity of sodium carbonate in lake-like deposits in various parts of the State.

The following Associated Press dispatch, appearing under a Cincinnati date line, Sept. 11, 1930, explains the high-points in the new discovery:

Soap is Medicinal

"The sulphuric smell in coal gas has been converted into a medicinal soap at the Ohio State University. Results of one year's experiments with this soap were reported to the medical section of the American Chemical Society, Thursday, by Dr. Emery R. Mayhurst, professor of hygiene.

"He said the soap is made from a new kind of sulphur which was discovered a few years ago while removing sulphur and other impurities from coal gas.

"This sulphur resembles moderately moist clay. It differs from other sulphurs in being composed of finer particles, all of them under six ten-thousandths of an inch in diameter.

"Twenty-five per cent of sulphur was mixed with castile soap and perfumed. At first it was tried upon members of his own family and those of a few scientists.

"No harmful effects appearing, it was then tried upon a wide variety of persons, from a baby to a machinist, and on various complexions. Professor Mayhurst said it was found free of damaging effects to the scalp, hair or nails, and did not sensitize the skin except for causing slight chapping in a few instances.

"Its effects were remarkable", he reported, "in practically all cases encountered of simpler chronic skin disease like eczema, acne and facial blemishes."

Three manufacturers of plated materials informed Professor Mayhurst that the soap appeared to cure plater's rash and one concern reported that after a siege of machinists' boils lasting about 5 years the soap eradicated them within three months.

New Mining Industry Has Remarkable Development

Just four years ago the Pratt Sodium Sulphate Company shipped its first carload of soda from Casper. Today it has contracts for the delivery of in excess of one thousand tons of crude soda per month.

The development of the lakes eight miles northeast of Casper was started in May, 1926. These lakes cover an area of about 12 acres, and are underlaid with a vein of crystallized sodium sulphate 12 feet in thickness. The places where mining operations were first started in 1926 are now again filled with a fresh supply of soda. The lakes

seem to be fed from springs, and the water carries the soda to the surface, where it crystallizes and replaces itself in a four-year period.

The sodium sulphates mined from these lakes is 99.2 per cent pure, there being very little of other minerals in the solution. The sand and dirt content is very low and it is not necessary to refine the product for all the uses to which it is put.

While there are many soda lakes to be found in Wyoming, there are very few that contain sodium sulphate, which has a very large commercial use, some of which are the manufacture of glass, paper and paint. It is also largely used in medicines and stock remedies.

Mining operations are conducted by blasting and loading with steam shovel, about the same as strip mining in the coal fields. The water is pumped out of that portion of the lake where the miners are at work, and roads are built so trucks can be driven into the pit and loaded. Eleven miners are employed in this work.

The company has also leased the Gill lakes about 18 miles north of Casper, and at the present time is mining soda there. It has been necessary to build 13 miles of road, one and one-half miles of which he has gravelled. The company also mines the lakes 25 miles north of Rawlins on a lease agreement.

At the Casper property the company has a large drying shed in which is stored several thousand tons of dry soda ready for shipment. It also has a well constructed camp for the accommodation of the men and machinery. The company shipped approximately three hundred carloads of soda from Wyoming in 1929, and under present contracts will probably ship five hundred carloads in 1930.

The greatest part of sodium sulphate used in the United States is shipped to this country from Germany and Canada. The low water rates makes it possible to lay German soda into Chicago at a competitive price with Casper soda. The biggest market for soda is on the Atlantic coast, but the company cannot compete with German and Canadian soda east of Chicago, due to lack of a tariff and the costs of transportation.

The company has a supply of its product that would last indefinitely, mining 50,000 tons per year. The company is well financed and is enjoying a steady growth. There is no stock for sale, and at the present rate of growth, this promises to be one of Casper's larger industries within a few years.

CHAPTER X

THE PETROLEUM INDUSTRY

Early History of Petroleum in Wyoming

Captain Bonneville, in his explorations in what is now the State of Wyoming, was probably the first white man to give to the world the news that petroleum deposits existed here. In 1833, this famous explorer found an oil spring near where Lander now stands and in what is now the Dallas field. The Captain was directed to the seep by Indian guides who stated that they used the seeping petroleum for anointing the joints of their ponies to make the animals go faster. They also used it as a medicine.

Captain Bonneville recorded the location of this oil seep in his report to the War Department. There the report was pigeonholed until after the Civil War days and in 1866, General Connor sent a man named John C. Fiere to Fort Bridger to confer with a Judge Carter at Fort Bridger, Judge Carter being the Post Trader. Judge Carter had reported that petroleum seepages were noticeable near the Fort. Fiere had some experience in Oil Creek Valley in Pennsylvania before coming West and for this reason was selected by General Connor to examine the seep near Fort Bridger.

Fiere approved the findings of Judge Carter and these two men formed a company to put down the first well in what is now the State of Wyoming. Crude tools of the churn drill type, patterned after the Drake equipment in Pennsylvania as best Fiere could recall, were hammered out on a blacksmith's anvil and the drilling commenced.

At a depth of 50 feet, the tools entered a crevice and the bailer came up full of oil at every run. The work was all done by man power, the old spring pole method of kicking down a well being used and the bailer was raised by hand.

So far as the meagre records go, this well produced about 150 barrels of oil before it caved in. This oil sold for from \$20.00 to \$25.00 per barrel and it found its main market on the Union Pacific Railroad and in the machinery of the Black Butte Coal Mining Company.

Judge Carter died shortly after and Fiere sold his share to the Carter heirs, who later cleaned out the old well and continued the drilling down to 100 feet, with an increase in the production. This oil was marketed locally and to the railroad, without any attempt at that time to refine it. Later it was heated to drive off the lighter naphthas

as these highly inflammable vapors and gasolines were useless in the economy of the West at that period.

The sale of the crude oil from this well began to interfere with the shipments of oils from the Pennsylvania regions and an agent for an eastern oil company came west and succeeded in buying the well. It was immediately closed in and as no more work was done towards cleaning out the cavings that were continually dropping in from the walls of the hole, it soon filled up and ceased production altogether.

In the meantime, the Mormon caravan passing through what is now known as the Bessemer Bend country, found some oil seeps there that yielded some oil for their wagons. Later travelers enlarged the seeps by digging pits and some of these were put down 30 to 40 feet, being about six or eight feet square. Later the town of Bessemer was started and a well drilled that failed to find any production whatever. All that remains of Bessemer now is the faint outline of the streets through the sage brush and the cellars where the houses stood.

The French Oil Company, composed of French capital in the main, drilled a well on Dugout Creek that also came in dry.

In 1881, a Dr. Graff of Omaha, Nebraska, formed a syndicate and purchased the oil seep discovered by Captain Bonneville, in the Popo Agie Valley and called the Popo Agie oil spring. The product was marketed for medicinal purposes and also for lubrication. This not proving very remunerative, the Doctor and his associates then decided to drill some wells, and in 1883 and 1884 three holes were put down with tools made locally and patterned after a set that had been purchased in the Pennsylvania oil fields and shipped to Rawlins, then hauled across to Lander.

The production from the three wells was marketed at the stations along the Union Pacific Railroad and hauled to the shipping points with string teams. Later the refined oils from the Pennsylvania refineries gradually drove the heavy black oil from the market. The wells near Lander were banked up with dirt and abandoned for the time being.

In 1886, P. M. Shannon, an oil operator from Bradford, Pennsylvania, traveled west on a trip of pleasure, in the main. He left the railroad at Laramie and journeyed over the trackless plains northward, expecting to reach the Northern Pacific in Montana and journey back to his eastern home by that route.

A cowboy described an oil seep to Mr. Shannon and interested the oil operator to an extent that he went off his course to view the seep. He immediately became interested and the rest of the hunting trip was abandoned. He

returned to Bradford after negotiating for various holdings in what is now the Salt Creek field, then Mr. Shannon moved a drilling machine by rail to Laramie and hauled it by horses some 200 miles across to the present Salt Creek area. The drilling crew was also brought from back in Pennsylvania and when these men saw the white incrustations of alkali along the banks of the stream that cuts the Salt Creek field area, they erroneously called it salt without investigating it very closely and thus the name "Salt Creek" was evolved.

Mr. Shannon hauled his drilling machine across one of the greatest oil fields the world has ever known, to drill for the small wells in the Shannon pool at the north end of the field. The first well reached a depth of about 500 feet in the fall of 1889 and found oil. By 1893 the production amounted to 2,300 barrels per year and was being hauled by string teams to Casper and shipped from that point.

The deepest well in Wyoming was drilled in the Simpson Ridge field, in Carbon County, by the Producers & Refiners Corporation, with cable tools. This hole reached a depth of 6,941 feet, but failed to find any producing sand and was abandoned as a dry hole. Location Sec. 20, Twp. 21 N., Rg. 80 W.

Recently a well drilled by the Resolute Oil Company in Badger Basin, on Sec. 17, Twp. 57 N., Rg. 101 W., reached the Frontier sands at a depth of 8,255 feet.

The largest oil well found in Wyoming was the No. 301 well of the Mammoth Oil Company on Teapot Dome. This well found a shale pocket at 1,520 feet and produced at the rate of 28,000 barrels daily for six days and then bridged. It was drilled with cable tools and was located on Section 2, Twp. 38, Rg. 78. It is shut down at present, but was capable of a nominal production at the time it was shut in.

The largest gas well was probably the Midwest Refining Company's big gasser in the Little Buffalo Basin field. This well was estimated at 130,000,000 feet daily when it came in and it is located on Sec. 12, Twp. 47 N., Rg. 100 W. It was drilled with cable tools.

The Wertz No. 8, drilled by the Producers & Refiners Corporation in the Lost Soldier field may also compete for the record of having been the largest gasser in Wyoming. It is located on Sec. 7, Twp. 26 N., Rg. 89 W.

Developments in the Oil Industry in 1928

The total production in the state for the year amounted to 21,485,484 barrels, an increase over the previous year of 306,765 barrels. The daily average for the year was 58,864 barrels. Salt Creek field produced a total for the year of 14,041,030 barrels, compared with 14,352,792 for the previous year, a decrease of 311,762 barrels.

The increase for the year is accounted for by reason of the Oregon Basin field in Park County, discovered in 1927 but not produced, was on production since February, marketing a total for the year of 829,467 barrels and the Labarge field in Sublette County, which received a pipe line during the year and thus increased the runs in 1928 to 501,995 barrels, compared with 338,322 for 1927. These two large increases more than compensated for the natural decline of old fields and the abandonment of Teapot Dome, which during 1927 produced 313,892 barrels and nothing in 1928.

Three new producing districts were discovered during the year, two of which have possibilities of becoming factors in production. The Alkali Butte structure in Fremont County was developed by the Texas Production Company into the Muddy horizon, getting a 300 barrel well. Although the well was regarded as off structure or rather in a fault plane, they had thick members of the Frontier with oil showings and a flowing well of 39 gravity oil in the Muddy with possibilities for the Dakota-Lakota group. This is one of the most important discoveries in the western part of the state for several years and will cause considerable prospecting the coming year on this structure and known surrounding structures, Big Sand Draw to the south, where no test has ever been carried through the upper members of the Frontier owing to the heavy gas; Horseshoe and Muskrat Domes to the east, where the Producers & Refiners during the year found a 70,000,000 gas well in the upper Frontier, and the old Pilot Butte district on the west.

Ant Hills district in Niobrara County, northeast of the Lance Creek field, was prospected by the Continental Oil Company with the result that one small well was found. It is hardly probable that this will make a producing area of any consequence.

The Frannie district in northeastern Park County was discovered during the year with one good producer in the Embar black oil series. The crude has a gravity of 29 and is regarded as the best Embar oil found in the state. Midwest interests have secured the producing area and are

now drilling three wells. The oil is going to their Greybull refinery.

The important oil items which occurred during 1928 include the purchase by the Texas Production Company of the Rocky Mountain properties of the California Petroleum Corporation, the cancellation by the Government of the Sinclair contract in the Salt Creek field, awarding a three-year contract to the Texas Production Company and White Eagle Refining Company for this oil; the completion of arrangements for a gas line by the Ohio Oil Company and associated interests from the Baxter Basin and Hiawatha Dome districts in Sweetwater County, Wyoming, and Moffatt County, Colorado, to Salt Lake City, Ogden and other Utah and Idaho cities; the discovery of what possibly may be the biggest gas field in the state, the Muskrat Dome in Fremont County. This is one of the largest domes in the county and there are no less than five smaller domes adjacent to or connecting. Producers & Refiners Corporation, drilling in the northwest corner, SE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 34-34N-92W, at 4312 feet, supposed to be the top of the Frontier, developed ten million cubic feet of gas. Tools were lost when the gas was found and in attempting to recover same three strings of fishing tools were lost. A string of 4" drill pipe was run to fish out the tools and had just taken hold of the top string when the well blew in for seventy-five million cubic feet, 1300 pounds rock pressure, cleaning the hole of the drill pipe and four strings of tools.

This is also an important discovery from the standpoint of possible oil production elsewhere on the structure. While drilling this test, in shale formation at 3820 a good showing, estimated 5 barrels daily, of 41 gravity oil was found and at 3880 gas sufficient to clean the hole. With the lower members of the Frontier and the Cloverly series untested this structure offers encouraging prospects for further development.

West of this structure on what is known as Alkali Butte, Texas Production Company, in the southeast corner, SE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 1-33N-95W, at 3952, believed to be in a sandy member of the Muddy horizon, found oil, which steadily increased with deeper drilling until at 3987 the well was flowing by heads 25 barrels per hour. The well was drilled to 4240 without apparently helping but contrary to expectations, did not go into water, and was plugged back to 4175. The oil has a gravity of 39 Baume and contains about 60% gasoline.

The Frannie structure in Park County was discovered by E. H. Rosenburg and associates of Los Angeles, the well

being drilled in the northeast corner, NW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 25-58N-98W. Embar was topped at 2585 and drilled to 2600 with an initial production of 300 barrels. The oil has a gasoline content of 20% and is 28 gravity. Characteristic of Embar production, there is some water but it settles out quickly without necessity of treating.

Three other sections of the state were successful in getting small oil wells but not sufficient to be regarded as commercial and cannot be considered as new fields or of importance.

Another discovery during the year which may be of importance in future development was the test by the Producers & Refiners Corporation in the northwest corner, SE $\frac{1}{4}$ Section 25-26N-87W in the old Ferris field in Carbon County. Tensleep sand was topped at 4523 and flowed 700 barrels of oil the first 24 hours. However, according to the reports put out by the operators, it quickly went to water. The most remarkable feature of this development is the physical properties of the oil found in what has always been regarded in Wyoming as the black oil series. It is green in color, has a paraffin base, tests higher than 36 gravity and contains 24% gasoline. Producers & Refiners plugged the test back to the Chugwater, after drilling a few feet deeper in the Tensleep for more water, and has surrounded the test with considerable mystery. However, the speculation for the possibilities of light oil production from the older beds than the Cretaceous in the Little Lost Soldier basin may attract some drilling the coming summer.

The year closed with an important transfer of properties—the purchase by the Continental Oil Company of the Rocky Mountain properties of the Union Oil Company of California.

Possibilities for additional discoveries in this year's drilling campaign are favorable as there are fifty-one tests drilling, some of them on untested favorable structures. Of course the new fields discovered last year will receive considerable attention in new drilling and quite probably, with their increased production, will about offset the natural decline in old fields. Estimates of production being made by the interested producing companies in the state, not considering possible new production, are being placed at 19,000,000 barrels for 1929.

The geophysical work started late last summer in the Tertiary basins of the state will probably be continued with favorable working weather and it is possible that through this method hidden structures may be located which will attract drilling.

Fremont County, with the Muskrat and Horseshoe domes, Alkali Butte, Sand Draw and Pilot Butte districts attracting attention, will probably be the most active district in the state. Midwest interests and Texas Production Company will start geophysical work in these districts as soon as weather permits and the Producers & Refiners Corporation will continue their exploration of the area in the Big Sand Draw district. They are now attempting to carry two of the gas wells through the big gas in the upper Frontier and a determined effort will be made to drill through the Frontier series and to the Dakota-Lakota at least.

Producers & Refiners are now conducting geophysical work in the Little Lost Soldier basin, principally in Carbon County. A large part of this basin is rather obscured by unconsolidated surface material and they are now operating diamond core drills as a preliminary step to further geophysical work.

All things considered, the year 1928 was very satisfactory to Wyoming producers. The crude commanded a profitable price and, contrary to the condition in the Mid-Continent district, there was a refinery demand for even more than the production to the extent that State and Government royalty oil were both sold at an attractive bonus. The state is firmly established in the position as leading in production in the Rocky Mountain district.

During the year 1928, the Texas Production Company completed but had not put in operation a 10,000 barrel refinery at Cody, Wyoming, to handle black oil, primarily built to accommodate the surplus oil of the Oregon Basin field. It is possible that during the coming year more black oil refineries will be added for the western part of the state where there are black oil fields shut in.

Developments in the Oil Industry in 1929

In 1929 the total number of wells completed was 140, while in 1928 the total amounted to 203. Out of these 140 wells completed in 1929, 45 were dry holes and 95 were commercial producers, either oil or gas.

Low market for crude oil that prevailed during 1929 and the large stocks of oil in storage contributed to the general decline of interest in petroleum in Wyoming during that period and there is every indication that this condition will continue during 1930.

No new fields were opened in 1929 in the State of Wyoming. A few fields showed an increase in production due to development in the the known productive areas and

this is especially true of Frannie and Oregon Basin. The Fourbear Field had its first well tested in 1929, but this area was known to contain oil because of a well drilled previously.

In view of the above conditions, the oil companies operating in the State of Wyoming have turned their attention to the production of oil from the areas already developed and have abandoned the search for new fields for the time being.

Some of the larger operating companies have turned their attention to the marketing of natural gas, the Baxter Basin and Hiawatha fields being developed as gas producing areas and a trunk line system is carrying this gas to Salt Lake City and intermediate points. This trunk line was totally completed in 1929 though it was carrying gas in some sections during the previous year.

At the close of 1929, the announcement was made that the Smith interests operating the gas distribution system in Sheridan, Wyoming, had contracted with the Carter Oil Company for the natural gas production of the Billy Creek Field in Johnson County and that a pipeline would be laid from that field to Sheridan, going through Buffalo and supply natural gas to Buffalo and Sheridan.

One of the most important discoveries for 1929 was the finding of gas production in the Kinney Coastal Oil Company's well in the Pilot Butte Field, Fremont County. This field has been known as a shallow oil field for many years and the deep test of the above company found the gas in the Muddy sand with a daily production of 63,000,000 cu. ft. This well is known as the Dykeman No. 1 and is located on the SE $\frac{1}{4}$ SW $\frac{1}{4}$, Sec. 22-3-1, Wind River Meridian. At present the gas flow has been mudded off and the well is drilling deeper for a test of the Dakota formation. There are also five sands lying below the Dakota formation that may contain petroleum in this area. The Muddy sand was found at 3,365 feet.

In the Billy Creek field, the Carter Oil Company completed a deep test to the Muddy sand and found oil production in its Belt No. 2 well, located on State Sec. 36-48-82. The well is expected to make 250 barrels daily when placed on production and is considered to be a narrow belt of oil between the water and the gas production that occupies the central part of the field. The well was brought in February 16th.

There was little change in the physical aspects of the oil fields and refining plants during 1929, in Wyoming. The Mere refinery located at Thermopolis was purchased by B. V. Hole and others and moved to Pedro, near Newcastle,

where it is to be rebuilt and become a refinery for a shallow oil production in the Pedro field.

In the production of gas and gas products, the gas fields of the State of Wyoming produced a total of 39,278,794,000 cubic feet of gas for 1929. Of this amount, 30,375,831,000 cubic feet was wet gas and was passed through some system to recover the gasoline content. This left a total of 8,902,963,000 cubic feet of dry gas that was sold without treatment of any kind. The production of natural gas gasoline for the State of Wyoming in 1929 amounted to 44,375,831,000 gallons.

There is only one carbon black plant in operation in Wyoming at this time and this plant made a total of 6,011,367 pounds of carbon black for the year 1929. This carbon black had a value of \$360,682.00.

The amount of wildcat work done in drilling wells for new fields during 1929 amounted to a total of \$2,209,000.00, the lowest for this branch of the petroleum industry since 1914. The above sum is for strictly wildcat wells drilled in Wyoming and does not include any development or drilling in the known areas.

Geophysical work in the state the past year was not conducted to the extent expected. Midwest interests conducted some geophysical work on the Midway and Geary domes in eastern Natrona County and western Converse County and as a result completely blocked up these domes and announced a deep test for this year. These domes are midway between the Salt Creek field and the Big Muddy field. Producers & Refiners Corporation drilled some 50 core drill tests on the Muskrat and Horseshoe domes in Fremont County, and late in the year found them core drilling two structures in western Carbon County.

Early in the year the Carter Oil Company, drilling in the center SW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 16-48N-82W, on the Billy Creek structure in Johnson County, in the top of the first Wall Creek sand, 3210-3240 got a well that would probably pump 200 barrels. The oil is paraffin base but only 21 gravity. The oil contains no flash ends and comes from the well partly congealed. Swabbing tests were made and some 1400 barrels taken from the well.

During the late summer and early fall some 75,000 acres of land in southeastern Converse County and southwestern Niobrara County were leased by the Northern Oil Company, headed by Spencer Penrose and associates. The leases were taken on a one-tenth basis with a proviso that 18 months would be permitted for geophysical work before actual drilling would start. This is one of several blocks

that have been taken the past two years in what is known as the Powder River basin, and should any structure in this basin prove productive, it would offer greater possibilities for development than any section in the state. Light oil would be assured, if any, and this basin, on the west slope of the Black Hills and the east slope of the Big Horn Mountains, is some 55 miles in width and 80 or more miles in length. On the west side is the Billy Creek gas field, the Salt Creek and Big Muddy oil fields with the Lance Creek, Mule Creek and Osage oil fields on the southeast and east and northeast.

During the year 1928 the Texas Production Company completed but had not put in operation a 10,000 barrel refinery at Cody, Wyoming, to handle black oil, primarily built to accommodate the surplus oil of the Oregon Basin field. During 1929 a total of 252,000 barrels was run through this refinery.

Developments in the Oil Industry in 1930

During the summer of 1930 a pipe line was laid from the Billy Creek field in Johnson County to the cities of Buffalo and Sheridan, to provide natural gas from that field to these points.

The Midwest Refining Company drilled a deep test in the Salt Creek field, Section 35-40-79 and found black oil in the Tensleep sand. On February 21st, this well flowed by heads at the rate of 500 barrels per hour. Later the well was killed in this sand and drilled to the granite. A showing of oil was found in the Madison Lime and a great flow of artesian water was also uncovered in this formation. After this well reached the granite it was plugged back to produce the Tensleep sand.

The Osage Trust Company drilled a wildcat well on the west side of the Osage field, Weston County, on Section 14-46-64, State land, and discovered a new pool on that side of the Osage field. The well had an initial production of 400 barrels.

The All States Development Company drilled a deep test on Section 36-37-82 in the North Casper Creek field and found a 250-barrel well in the Tensleep sand.

The Producers & Refiners Corporation drilled a deep test in the Mahoney Dome field of the Lost Soldier district during the spring and summer of 1930 and found the Tensleep sand productive of oil there at a depth of 4,650 feet. This crude is a mixed base oil and is the second structure in the Lost Soldier field to be found oil producing in the

Tensleep sand, Ferris Dome on the east having been found productive several years ago.

The Ohio Oil Company discovered oil production in the Tensleep sand in the Byron field, Big Horn County, at a depth of 5,460 feet and also found that the Tensleep sand carries large volumes of natural gas. The same company also developed a new deep sand field across the State line in the Dry Creek structure in Montana. While the Byron development and other deep tests in Wyoming were mainly black oil, the Dry Creek well of the Ohio Oil Company tested 52 degrees gravity and is estimated at 1,000 barrels daily.

The Midwest Refining Company drilled a deep test on the Midway Dome, Natrona County, that reached the lower Frontier sand in July, 1930, at a depth of about 5,200 feet. The well is estimated good for 450 barrels daily of a rather low gravity, paraffin base crude.

The Argo Oil Company, drilling a deep test in the Mule Creek field, Niobrara County, Section 19-39-60, found production in the lower Minnelusa sand (Tensleep), and the well will make about 40 barrels daily of a high gravity black oil. The depth is 3,180 feet.

The Ohio Oil Company is now drilling a deep test in the Lance Creek field and the Ohio Oil Company and the Continental Oil Company are each drilling deep tests in the Big Muddy field.

Due to the interest aroused by these deep tests over Wyoming, more of the same are proposed to be drilled and it is expected that every field will be tested in the deeper horizons as soon as the market justifies the expenditure.

OIL FIELDS OF WYOMING, PRODUCING OILS SUITABLE FOR ROAD BINDER

Field	County	Sand	Gravity	Base
Aspen	Uinta	Bear River	17.2	Asphalt
*Black Mountain	Hot Springs	Embar & Tensleep	22.6	Asphalt
Bolton Creek	Natrona	Sundance & Tensleep	25.0	Asphalt
*North Casper Ck.	Natrona	Embar & Tensleep	23.6	Asphalt
*South Casper Ck.	Natrona	Sundance & Tensleep	14.1	Asphalt
Cedar Ridge	Carbon	Embar	20.0	Asphalt
Circle Ridge	Fremont	Embar	23.7	Asphalt
*Crystal Creek	Big Horn	Embar	18.0	Asphalt
*Dallas	Fremont	Embar	23.3	Asphalt
*Derby	Fremont	Embar	23.3	Asphalt
Frannie	Park	Embar & Madison	27.5	Asphalt
*Four Bear	Park	Embar & Tensleep	15.0	Asphalt
Ferris	Carbon	Dakota & Embar	31.1 & 15	Mixed Base
*Grass Creek	Hot Springs	Tensleep & Amsden	24.7	Asphalt
Hale Dome	Hot Springs	Embar	17.0	Asphalt
Hamilton Dome	Hot Springs	Embar	25.2	Mixed Base
Hudson	Fremont	Embar & Tensleep	23.0	Asphalt
Lake Creek	Hot Springs	Embar	20.0	Asphalt
*Mahoney	Carbon	Frontier	27.1	Asphalt
*Maverick Springs	Fremont	Embar	21.8	Asphalt
*Moorcroft	Crook	Dakota	16.0	Asphalt
Notches	Natrona	Tensleep	23.0	Asphalt
Oregon Basin	Park	Tensleep & Embar	22.8	Mixed Base
*Pine Mountain (see note)	Natrona	Tensleep	17.0	Freak Base
*Poison Spider	Sundance & Tensleep	Natrona	22.0 & 15	Asphalt
Shoshone	Park	Embar	18.0	Asphalt
Simpson Ridge	Carbon	Mesa Verde	20.0	Mixed Base
Spindletop	Natrona	Embar	21.8	Asphalt
*North Sunshine	Park	Tensleep	15.8	Asphalt
*Warm Springs (see note)	Hot Springs	Embar	11.9	Asphalt
Wild Horse Butte	Hot Springs	Embar	14.0	Asphalt

The oils from the fields marked with an asterisk have greater tenacity in mixes of shale, or sands and gravels than the fields not so marked. These oils are, therefore, better adapted for road oils and binders than the others.

Note (a)—Pine Mountain crude is a freak oil and is generally classed as an asphaltic base crude. It has the strongest cohesive qualities of any other oil tested in the Rocky Mountain region.

Note (b)—Warm Springs oil has two grades in reality. The better grade for road oil is produced on the State of Wyoming Section 86. This crude makes a natural asphalt as the lighter contents will evaporate out at ordinary temperatures and pressures and leave the asphalt. This was exemplified when a tank bottom broke on the State Section and the trail nearby is covered with asphalt as a result.

CHAPTER XI

GEOLOGY

LIST OF ALL THE KNOWN STRUCTURES
OR ANTICLINES IN THE STATE, SHOWING
LOCATION OF SAME, DESCRIPTION OF SAME,
SURFACE FORMATION AND DEVELOPMENT
ON OR NEAR TO SAME

Structures in Wyoming

Alcova

LOCATION: T. 30 N., R. 82 and 83 W., Southern Natrona County.

SURFACE FORMATION: Chugwater to Tensleep.

STRUCTURE: Anticline pitching to the south.

REMARKS: A well drilled by the Kinney-Coastal Oil Company in NW $\frac{1}{4}$ of Section 23-30-82, was well located on the structure and was abandoned in granite at 1120'. Not favorable.

Alkali Butte

LOCATION: T. 33 and 34 N., R. 94 and 95 W., central Wyoming, Fremont County.

SURFACE FORMATION: Mowry and Thermopolis. Pierre on sides.

STRUCTURE: Northward plunging, closely folded anticline.

REMARKS: Sands: Muddy, Dakota, Lakota and Lower sands. The Apex Oil Company tested all sands in 2-33-95, dry and abandoned. Well reported to have oil showing in Morrison. Myrin Oil Company had a hole full of water in the Second Wall Creek sand at 3502' in 26-34-95. A second test by this company, in 10-36-94, was abandoned at 2530'. Texas Production Company, drilling in NW $\frac{1}{4}$ Section 1-33N-95W, last summer, got a 350-barrel producer of 39 gravity oil in the Muddy Sand at 3952-3983. Same company now drilling in Southwest Corner of SW $\frac{1}{4}$ SW $\frac{1}{4}$ Section 36-34-95.

Alkali Dome

LOCATION: T. 54 N., R. 95 and 94 W., Northern Big Horn Basin, 10 miles SE of Lovell, Wyoming, Big Horn County.

SURFACE FORMATION: Frontier with escarpment of Cody shale.

STRUCTURE: Anticline six miles long. Faulted across axis.

REMARKS: Greybull, Embar and Tensleep are the producing sands. Lewis et al. encountered two million cubic feet of gas at 2507' and had a show of oil at 2518', SE of SW $\frac{1}{4}$ of 11-54-95. Midwest Refining Company abandoned a test in the SE corner of 29-54-95, through the Greybull sand from 1100' to 1120'. Westland Oil Company now drilling two wells, one in 10-54-95, the other in 33-55-95. These have reached depths of below 500' and at present regarded as validating holes.

Alkali Creek Dome

LOCATION: T. 13 N., R. 99 W., Sweetwater County.

SURFACE FORMATION: Tertiary.

STRUCTURE: Anticline.

REMARKS: Ohio Oil Company last summer got a 44 million gas well in sand 2220-2240, in SE Corner of 24-12N-100W. Mountain Fuel & Supply Company, drilling in NW of SE of 18-13-99, is shut down at 3630. They had sulphur water at 2350.

Allen Lake

LOCATION: Five miles southwest of Medicine Bow, eastern Carbon County.

SURFACE FORMATION: Niobrara.

STRUCTURE: Narrow fold three miles long, axis is NW SE, doming at the NW end, lower dome SE of Union Pacific Railroad.

REMARKS: Cosden and Company developed 20 million cubic feet of gas in the discovery well in 34-23-79 at 1,376 to 1,405. The Dakota at 1414' was water bearing. Plains Oil & Development Company, in the NE $\frac{1}{4}$ of 20-22-79, found the Frontier sand, 885-952, dry, and water in the Dakota sand, 1900 to 1995. Well abandoned at 2050'. The SE side of the structure was tested by the Texas Production Company in SE $\frac{1}{4}$ NE $\frac{1}{4}$ SW $\frac{1}{4}$ of 18-22-78. Flowing sulphur water was encountered in this well in the Dakota sand at 1890', and the well was abandoned at 1950 feet.

Ant Hills Anticline

LOCATION: T. 37 N., R. 62 and 63 W., Niobrara County.

SURFACE FORMATION: Pierre.

STRUCTURE: Doubtful. May or may not be anticlinal.

REMARKS: Reported on by C. T. Lupton, whose conclusions are unfavorable. Located just west of Old Woman Anticline. Buck Creek Oil Company (Continental) completed a 50-barrel well in the Muddy sand at 3951-3958, going on to the Lakota at 4125 to find same water saturated. Two other wells were drilled on the structure by the Continental for failures.

Arch Creek

LOCATION: T. 48 and 49 N., R. 64 W., Weston County.

SURFACE FORMATION: Dakota.

STRUCTURE: Continuation of Pump Creek anticline with 100' of closure.

REMARKS: L. B. Lilley testing in NW corner 35-48-64, abandoned at 600'.

Arminto

LOCATION: T. 37 N., R. 86 W., West Central Natrona County.

SURFACE FORMATION: Steele shale with Shannon sandstone escarpment.

STRUCTURE: Compound anticline with Arminto and Lox domes.

REMARKS: Ohio Oil Company in 18-37-86, abandoned a well through the Second Wall Creek sand at 1662'. Wyland et al. in 20-37-86, developed six million cubic feet of gas in the three Wall Creek sands. This well has been taken over by the Texas Production Company and drilled to total depth of 3534' before abandoning. Unfavorable.

Baggs Anticline

LOCATION: T. 13 N., R. 92 W., Carbon County.

SURFACE FORMATION: Wasatch.

STRUCTURE: Small east-west structure.

REMARKS: A test of 7700' would be necessary to reach the Mesa Verde and a test of 12,700' would be necessary to reach the Dakota. Armstrong Syndicate has a rig up at a location in the northwest corner of SW $\frac{1}{4}$ of 31-13-91.

Bailey Dome

LOCATION: T. 26 N., R. 89 W., NW corner of Carbon County.

SURFACE FORMATION: Steele shale.

STRUCTURE: Plunging anticline.

REMARKS: Producers & Refiners Corporation in NE $\frac{1}{4}$ of 22-26-89, abandoned a test at 3350' through all known sand of the light oil series. They got 70 million gas in the Lakota at 3718' in the NW corner of 7-26-89, and are now drilling gas wells in northern part of this township and range. Sundance and Embar yet to be tested.

Bates Creek Dome

(See Carter Dome.)

Bates Hole District

LOCATION: T. 30 and 31 N., R. 80 and 81 W., Central Wyoming, Natrona County.

SURFACE FORMATION: Mowry.

STRUCTURE: Five domes along a westward plunging axis, as follows: Bodie Dome, Clark Dome, Freeland Dome, Schnoor Dome, and Two Bar Dome.

REMARKS: Only black oil can be expected on any of these domes. (See above domes under respective headings.)

Bates Park

LOCATION: T. 29 and 30 N., R. 81 W., Natrona County.

SURFACE FORMATION: Morrison.

STRUCTURE: Plunging anticline.

REMARKS: Test of the structure by the Arkansas Natural Gas Company, in 9-30-81, encountered water in the Sundance at 1965'. Leeper and associates, in 10-30-81, had a good show of oil in the Tensleep from 2530' to 2750'.

Baxter Basin

LOCATION: T. 18, 19, 20 and 21 N., R. 102, 103 and 104 W., Southwestern Wyoming, South of Rock Springs, Sweetwater County.

SURFACE FORMATION: Baxter shale, (lower Montana) (lower Hilliard).

STRUCTURE: Dome 64 miles long and 28 miles wide. Area where Frontier is in reach of drilling tools, 30 miles long and 11 miles wide. Highly faulted structure.

REMARKS: First active prospecting in 1900, Union Pacific Railroad drilled several deep wells for water in the years 1872 and 1873. In 1915-16, five wells were drilled north of the top of the structure, and four of them went through Frontier sands, getting various shows of oil and gas. One of these penetrated the Morrison. In Section 16-16-104, the Ohio Oil Company developed two million cubic feet of gas at the top of the Frontier and at 2505' encountered a flow of thirty million cubic feet of gas in the Frontier. Six miles north of the Ohio well, the Midwest Refining Company developed two million cubic feet of gas in the same horizon and 40 million cubic feet of gas in the Second Wall Creek.

The Dakota, from 2483 to 2622' was dry and from 2925 to 3025' the well developed a strong flow of sulphur water. Seven completed wells have developed a total of 158 million cubic feet of gas and these wells are distributed among operating companies as follows:

P. & R. and Marland, 1 well, 25,000,000.
Ohio Oil Company, 2 wells, 80,000,000.
Midwest Refining Co., 2 wells, 20,000,000.
Producers & Refiners, 1 well, 23,000,000.
Western States Oil Co., 1 well, 10,000,000.

Ten wells were abandoned on this structure in 1924, none of which constituted a test. The Associated Oil Company has a well shut down at 3287' in 23-17-104. Gas from this field is conveyed to the town of Rock Springs and to Salt Lake City by the Uinta Pipe Line Company. The chances seem good for oil farther down the structure. The SW part of the field is untested. See U. S. G. S. Bulletins 751G and 702. This dome, as several others in this vicinity and North of the Hiawatha district in Colorado, are now receiving several tests, and a gas line was built in 1929 from these fields to Salt Lake City, Ogden and other Utah and Idaho points. The Mountain Fuel and Supply Company has taken over all the gas wells and properties of other companies and is drilling several gas wells.

Beaver Valley

LOCATION: T. 42 N., R. 61 W., Northeastern Wyoming, Weston County.

SURFACE FORMATION: Pierre.

STRUCTURE: Dome.

REMARKS: The Carter Oil Company drilled in 6-42-61. Had gas show in Newcastle at 2738' and water in the Dakota at 3450'. Abandoned in the Lakota with a hole full of water at 3636'. A number of tests have been started by local enthusiasts in Weston County, but none ever completed.

Bear Dome

(See Crystal Creek.)

Belle Springs

LOCATION: T. 24 N., R. 88 W., Lost Soldier District, Carbon County.

SURFACE FORMATION: Niobrara.

STRUCTURE: Alluvium covered structure, probably closed by the Belle Springs fault.

REMARKS: Kasoming Oil Company, in 6-23-88, developed 11 million cubic feet of gas at 1920-1956'. Texas Production Company in 8-23-88, had hole full of water from 2430 to 2440'. New York Oil Company in 31-24-88, had a hole full of water from 2201 to 2215', and the Midwest Refining Company, in 16-24-88, abandoned its test at 3055'. The Utah Oil Refining Company in 33-23-88, is shut at 650'. The Prairie Oil & Gas Company has a deep test in the NE $\frac{1}{4}$ of the SE $\frac{1}{4}$ of 6-23-88. At 2561' in the Sundance sand, they got a hole full of water, and abandoned.

Big Hollow

LOCATION: T. 15 and 16 N., R. 75 and 76 W., Southern Wyoming, Albany County.

SURFACE FORMATION: Niobrara and Steele shales.

STRUCTURE: Northward plunging anticline.

REMARKS: In 6-15-75, water was encountered in the Frontier 575', oil of 28 gravity in the Harris (Muddy) at 900' and water in the Dakota at 1437'. Uncommercial field. G. R. McConnell drilled to 680' and abandoned in NE 24-16-77.

Big Dome-Maverick Springs District

LOCATION: T. 6 N., R. 2 W., of Wind River Meridian. Northern part of the Shoshone Reservation, Fremont County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Dome 7 miles long with 400' of closure. Part of Maverick Springs structure. Several faults.

REMARKS: Field is shut in on account of lack of pipe lines. 22.2° gravity oil. Estimated daily average yield from 22 wells, 2200 barrels. Several dry holes. First well drilled 1917. Producing horizon, Embar at 1100-1200'. Initial production of first well 240 barrels per day. Black oil field.

Big Muddy Oil Field

LOCATION: 12 miles southeast of Casper, Western Converse County, T. 33 N., R. 76 W.

SURFACE FORMATION: Pierre shale below the Parkman sandstone.

STRUCTURE: Dome 5 miles long.

REMARKS: The producing sands are the First and Second Wall Creeks, Dakota and Lakota. Production is mainly from the Wall Creek sands at from 3200-3400'. The average gravity of the oil from these sands is 35.5°. A deep test of the Midwest Refining Company made 250 barrels of 36.4° gravity oil in Dakota sand at 4203'. This well is also reported to have produced 50 barrels or more of asphaltic oil from the Lakota at 4362'. There are now 171 wells in the field which have a combined daily capacity of 2000 barrels of oil. It is the third largest field in the State of Wyoming. It was discovered in 1916, but active development work did not begin until the following year. Continental Oil Company last year completed a Lakota producer for 100 barrels at 4317'.

Big Piney

(Same as Dry Piney)

LOCATION: T. 28 N., R. 113 and 114 W., Sublette County.

SURFACE FORMATION: Adaville.

STRUCTURE: Superimposed dome on La Barge anticline (which see).

REMARKS: Oil in this district is produced from sand lenses in the Hillard. The oil is of 36.5° gravity. Beaver Petroleum Company abandoned at 2146' in NW $\frac{1}{4}$ of 9-29-113. Utah Oil Company in SW corner NE $\frac{1}{4}$ SW $\frac{1}{4}$ of 1-28-114, got a ten barrel well at 850, drilling to 2000' and abandoning.

Big Pole Cat

LOCATION: T. 57 N., R. 98 W., Big Horn County.

SURFACE FORMATION: Cody.

STRUCTURE: Structural Terrace.

REMARKS: Field is sometimes called McMahon Oil & Gas Field and Danker anticline. Four small gas wells have been completed and shut in. A test by the Trans-Continental Oil Company, in 30-57-98, was abandoned at 4420'.

Big Sand Draw Field

LOCATION: T. 32 and 33 N., R. 95 W., Central Wyoming, Fremont County.

SURFACE FORMATION: Steele shale.

STRUCTURE: Badly covered with Tertiary but may pitch to the north.

REMARKS: The producing sand is the upper Frontier. A well completed in 1918 good for 47 million cubic feet of gas. The Producers & Refiners Corporation had five wells, making from 25 million to 40 million cubic feet each. A pipe line has been built to Lander and Riverton and the Big Sand Draw field is now supplying those towns with gas for domestic use. The New York Gas Company also supplies the towns of Casper and Glenrock with gas from this field through. Oil possibilities in lower Frontier and Cloverley yet to be tested. A 10-inch and 12-inch line has been laid to connect with the Poison Spider line to Casper—a distance of 78 miles. The first well drilled on this structure encountered the First Wall Creek sand at 2531'; the initial rock pressure was 1350 pounds. The gas contains a small amount of gasoline. See U. S. G. S. Bulletin No. 711. Numerous efforts have been made to test sands below the Frontier, but were unable to get through the gas producing sand.

Big Sulphur Springs

(See Wilson Dome).

Billy Creek

LOCATION: T. 48 N., R. 82 W., Northern Wyoming on the east side of Big Horn Mountains, 15 miles south of Buffalo, Johnson County.

SURFACE FORMATION: Parkman and Steele.

STRUCTURE: Flat dome.

REMARKS: This field is operated jointly by the Carter Oil Company, Consolidated Royalty Company and Western Exploration Company. Seven wells were completed at the end of 1927, with estimated gas production of 350 million cubic feet per day. One well was dry. Production is from the Niobrara sandy shale and the Wall Creek sand. Lowest Frontier contained water at about 3600'. The Muddy and the Dakota sands are to be tested in 1928. The lower part of the main gas sand is saturated with oil in wells No. 5 and No. 6. The gas wells are shut in and at this time no market for gas. A test last year by Carter Oil, center SW¼ SW¼ of Section 16-48-82, was completed for 100-barrel pumper of dead 20 gravity oil, and shut in.

Black Mountain

LOCATION: T. 43 N., R. 91 W., South edge of the Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Mowry shale.

STRUCTURE: Closed anticline five miles long. Narrow, with strike fault along its crest. Basinward fold.

REMARKS: In 1923 the Utah Oil Refining Company completed a well in the SE corner of the NE¼ of NW¼ of 36-43-91, in the Tensleep, from 3197 to 3330', good for 250 barrels of black oil of 24.3° gravity. No. 2 well in Section 35, No. 3 well in Section 31,

are equally as good wells as No. 1. There are no pipe lines in the field and the wells are shut in. Other wells now drilling. Wells are shut in, as this is black oil and no market. Seven wells have been completed which made on a 60-day test, 750 barrels daily.

Blank

LOCATION: T. 27 N., R. 114 W., SW corner of Sublette County.

SURFACE FORMATION: Beckwith.

STRUCTURE: Flexure on a monocline.

REMARKS: Not in a favorable location. A number of tests have been started, but never completed in this locality.

Blue Springs

LOCATION: T. 43 N., R. 92 and 93 W., 12 miles east of Thermopolis, Hot Springs County.

SURFACE FORMATION: Mowry.

STRUCTURE: Anticline shaped like a reversed letter S. Four miles long. Not much closure. Closely associated with the Red Springs anticline further west. Hole drilled by Paul Stock was abandoned in the top of the First Wall Creek sand at 1500'. Hole full of water. Lower sands may hold possibilities for black oil. Structural map in U. S. G. S. Bulletin No. 656.

Bodie Dome

(Bates Hole District)

LOCATION: Section 33, T. 31 N., R. 80 W., Natrona County.

SURFACE FORMATION: Thermopolis shale.

STRUCTURE: Plunging anticline.

REMARKS: Iowa-Wyoming Oil Company abandoned a well in the center of Sec. 33 with a hole full of water at 780'. A. J. Hardendorf, in 33-31-80, reached the Dakota at 290' and the Sundance at 1300'. Producers & Refiners Corporation took the hole over at 1778' and encountered water in the Dakota 2050-2065', and in the Tensleep 2140-2167'.

Bolton Creek

LOCATION: T. 29 N., R. 80 W., Southern Natrona County.

SURFACE FORMATION: Mowry.

STRUCTURE: Closed anticline.

REMARKS: Sundance (Marine Jurassic) and Tensleep (Pennsylvanian) are the producing sands. The Sundance produces at a depth of 1000' and the Tensleep at 1800'. Both sands produce black oil but the lighter oil comes from the Tensleep. The Kinney-Coastal Oil Company controls the field. It has five wells with a potential production of 500 barrels per day of oil of an average gravity of 29 degrees. A six-inch pipe line from the field to Casper, a distance of 29 miles, was completed in 1922 but was not put in operation until 1925, when about 18,000 barrels of stored oil was delivered to the Producers & Refiners Corporation at Casper. Since then the production has been run to lease storage, about 20,000 barrels having accumulated.

Bonanza

LOCATION: East side of the Big Horn Basin; 12 miles S. of Manderson; T. 49 N., R. 91 W., Big Horn County.

SURFACE FORMATION: Thermopolis shale including Muddy sand.
STRUCTURE: Northwest plunging anticline, open to the south-east.

REMARKS: First discovery of oil in the Big Horn Basin was at Bonanza where an oil seep was found in the year of 1884. The first well was drilled in 1888. Water was encountered in the Cloverly at 600' in a well drilled in T. 40, R. 90. Seven wells were drilled on the structure up to 1916 without results. G. T. Markham tested the structure with a dry hole 2064' deep in 17-49-90. Hossier Oil Company drilled to 1000' in 28-49-91.

Boone Dome

LOCATION: T. 35 N., R. 85 W., Natrona County.
SURFACE FORMATION: Upper part of Steele shale.
STRUCTURE: Small closed dome.
REMARKS: The field produces gas from the Shannon sand at 2165'. Four wells produce about eight million cubic feet of gas per day. The field is controlled by the New York Oil Company. This company has a Diamond drill hole, in the southwest corner of Sec. 10-35-85, which was abandoned at 5293'. Gas from the gas wells is piped to Casper.

Bothwell

LOCATION: T. 26 N., R. 76 W., Albany County.
SURFACE FORMATION: Benton.
STRUCTURE: (?)
REMARKS: The Utah Oil Refining Company, in 1919, drilled in the NW $\frac{1}{4}$ of 30-26-76, to a total depth of 550' and encountered water in the Dakota.

Bridger Creek

LOCATION: Uinta County.
SURFACE FORMATION: Twin Creek.
STRUCTURE: Broad anticline, closure doubtful.
REMARKS: Untested. Oil seepage is common in this district.

Bridge Creek

LOCATION: T. 38 and 39 N., R. 61 and 62 W., Niobrara County.
SURFACE FORMATION: Pierre.
STRUCTURE: Mapped by E. M. Parks as a faulted dome.
REMARKS: Dry hole drilled in NE corner of SW $\frac{1}{4}$ of Section 29-39-61.

Broken Back Anticline

LOCATION: T. 48 N., R. 88 and 89 W., Southern Big Horn Basin, Washakie County.
SURFACE FORMATION: Tensleep.
STRUCTURE: Anticline.
REMARKS: Unfavorable stratigraphically for oil and gas. See U. S. G. S. Bulletin No. 656. Remote possibilities in Amsden and Madison.

Buck Springs

LOCATION: T. 34 N., R. 92 and 93 W., Central Wyoming, Fremont County.
SURFACE FORMATION: Fort Union.
STRUCTURE: Plunging anticline.

REMARKS: Western States Oil & Land Company abandoned a hole at 3055' without encountering any sands. Not considered favorable as the Frontier would be over 4000' deep. Prod. & Ref. test in NW corner SE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 34-34-92 and will test Frontier. Last summer got 75 million gas in the top of the Frontier at 4337'. Possibilities for oil in Lower Frontier and Cloverly.

Buck Springs

LOCATION: T. 23 N., R. 88 W., Carbon County.
SURFACE FORMATION: Steele shale.
STRUCTURE: Dome.
REMARKS: Producers & Refiners Corporation abandoned a test in SW $\frac{1}{4}$ of NW $\frac{1}{4}$ of the SE $\frac{1}{4}$ of Section 29-23-88, at 1342' after encountering water in the Frontier sand. Prairie abandoned with a hole full of water in the Sundance at 2561' in SE $\frac{1}{4}$ of Section 6.

Bud Kimball

LOCATION: T. 45 & 46 N., R. 88 W., Southeast side of the Big Horn Basin, Washakie County.
SURFACE FORMATION: Chugwater.
STRUCTURE: Plunging anticline ten miles long with possibly one or two small closures. Highly faulted.
REMARKS: Not considered very favorable but may have black oil possibilities. Structure mapped in U. S. G. S. Bulletin No. 656.

Buffalo Basin

(See East and West Buffalo Basin).

Bull Creek

LOCATION: T. 58 N., R. 62 W., Crook County.
SURFACE FORMATION: Mowry.
STRUCTURE: Mountainward fold.
REMARKS: Ute Petroleum Company abandoned a well at 967' in Section 3-57-62. The Minnelusa Limestone at 2000' is untested.

Bunker Hill Dome

LOCATION: T. 27 N., R. 69 W., Southwestern part. Northeast of Wertz Dome, Carbon County.
SURFACE FORMATION: Mesa Verde.
STRUCTURE: Dome.
REMARKS: The Kasoming Oil Company's well, NW corner of the NW $\frac{1}{4}$ of 32-27-89, on the crest of the dome was abandoned in the Steele shale at 827'. The Frontier series should occur approximately at 6700'. The producing sand in the G-P Dome should be encountered in this structure at approximately 5300' (See G-P Dome). See U. S. G. S. Bull. No. 756.

Burley Dome

LOCATION: T. 32 N., R. 94 W. Four miles east of Big Sand Draw, Fremont County.
SURFACE FORMATION: Chugwater.
STRUCTURE: Two-thirds of dome obscured by Tertiary.
REMARKS: Ketch & McLennen, in 5-32-94, abandoned a hole in the Red beds at 3735'. Burley Oil Company in same section shut down at 2725' since fall of 1923.

Burriss Dome

LOCATION: T. 42 N., R. 79 W., Johnson County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Probably none.
 REMARKS: Salt Creek Extension Oil Company, now drilling in 28-42-79, had a dry hole in the Shannon sand from 1308 to 1329. The well was shut down at 3155' for the winter, and will probably be abandoned at this depth.

Butte Field

LOCATION: Near Moorcroft, Wyoming, Weston County.
 SURFACE FORMATION: Cloverly.
 STRUCTURE: Monocline.
 REMARKS: Capable of producing a small amount of oil from Dakota sand wells at 300'. No development for several years.

Byron Dome

(See also Garland)

LOCATION: T. 56 N., R. 97 W., Northern Big Horn Basin; 3 miles NE of Byron, Big Horn County.
 SURFACE FORMATION: Cody shale in center, Mesa Verde on flanks.
 STRUCTURE: Northwest southeast trending anticline eight miles long and one and one-half to two miles wide. Doming at south end. Faulted. 2500' of closure.
 REMARKS: Oil production from the Frontier and gas production from the Dakota. At South Byron the second Wall Creek sand (Peay) is found at 700-900' and is oil bearing. Gas in the Dakota at 1842'. The Morrison is also possibly productive of some gas. At North Byron, in Section 27-57-98, gas was encountered in the Torchlight sand at 2232'. Rated as an important oil and gas field. The daily average production of oil in 1925 was 50 barrels from 9 wells. Light oil of 44.2 degrees gravity. All producing oil wells on Lot 52, Sec. 34-56-97 (Allen Oil Company). This area is highly faulted. Two gas wells gauged one hundred million cubic feet per day. Field supplies Lovell and Byron with gas. Oil accumulation probably caused by faulting. See Wyoming Geol. Survey Bulletin 14. U. S. G. S. Bulletin 656 and U. S. G. S. P. P. 53. Producers & Refiners in SW NW NE of 24-56-98, abandoned at 2640', and Utah Southern in NE corner of 29-56-97 at 915'.

Canyon Creek Dome

LOCATION: T. 12 N., R. 101 W., Sweetwater County.
 SURFACE FORMATION: Wasatch.
 STRUCTURE: Northeast-Southwest trending anticline.
 REMARKS: Untested but probably stratigraphically unfavorable.

Carter Dome

LOCATION: T. 29 N., R. 81 W., Southern Natrona County.
 SURFACE FORMATION: Steele.
 STRUCTURE: Dome.
 REMARKS: Structure tested by the Carter Oil Company in the SE ¼ of 23-29-81. The Dakota was water-bearing from 2255 to 2270'. Well ended in the Sundance with a hole full of water at from 2801 to 2870'.

Casper Dome

LOCATION: T. 33 N., R. 79 W., Natrona County.
 SURFACE FORMATION: Pierre.
 STRUCTURE: Faulted dome.
 REMARKS: Tested through the first Wall Creek sand with a hole 2930' deep. Water.

Castle Creek

LOCATION: T. 37 & 38 N., R. 80 & 81 W., Natrona County.
 SURFACE FORMATION: Steele and Mesa Verde.
 STRUCTURE: Open fold.
 REMARKS: Midwest Refining Company drilled to 2625' in 31-38-80. This well was located on structure and encountered some gas in the shales above the Wall Creek series. The second Wall Creek was water-bearing and the third Wall Creek at 2620' was dry.

Cedar Ridge

LOCATION: T. 22 N., R. 85 W., Carbon County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Faulted Anticline.
 REMARKS: The Frontier would be at excessive drilling depths and the only chance of production would be in the basal Mesa Verde. The Producers & Refiners Corporation, drilling on the NW ¼ of 35-22-86, found the sand from 2001-2014' dry.

Centennial

LOCATION: T. 15 N., R. 78 W., Southern Wyoming, Albany County.
 SURFACE FORMATION: Steele.
 STRUCTURE: Faulted.
 REMARKS: Centennial Valley Oil Company, in 12-15-78, completed a well through the Dakota at 3013', which formation was water-bearing.

Chabot

LOCATION: T. 43 N., R. 88 W., Washakie County.
 SURFACE FORMATION: Mowry.
 STRUCTURE: Faulted anticline. Structure small.
 REMARKS: Untested. Possible production in faulted area.

Chalk Cliffs

LOCATION: Section 10-21-75. Southern Wyoming, Albany County.
 REMARKS: Data meager. Chugwater lies at 700'. Well drilled to 1225' was still in red beds.

Cherokee Ridge

LOCATION: T. 12 N., R. 102 W., to T. 13 N., R. 94 W., Sweetwater County.
 SURFACE FORMATION: Wasatch to Blair. (Tertiary.)
 STRUCTURE: Sharp, faulted anticline.
 REMARKS: Untested. Structure mapped in U. S. G. S. Bulletin No. 702.

Cherry Dome

(See Shell Creek)

Cheyenne River

LOCATION: T. 39 N., R. 61 W., Eastern Wyoming, Niobrara County.
 SURFACE FORMATION: Mowry.
 STRUCTURE: East of Mule Creek Field.
 REMARKS: Stanley Green drilled a well in 25-39-61, to 1530'. He had a show of oil in 70' of Dakota sand and at 735'.

Circle Ridge Dome

(Maverick Springs District)

LOCATION: T. 6 & 7 N., R. 2 & 3 W., of the Wind River Meridian, Northern part of the Shoshone Indian Reservation, Fremont County.
 SURFACE FORMATION: Embar. (Dinwoody-Park City.) Asphalt Seepages.
 STRUCTURE: Dome 4 miles long with 500' closure. Several faults with throws of less than 50'.
 REMARKS: Continental Oil Company has two wells completed in the Tensleep that are capable of producing 2000 barrels of black oil per day. Shut in. No pipe line. Part of Maverick Springs structure. Structural map in U. S. G. S. Bull. No. 711-H.

Chicago Creek

LOCATION: T. 56 N., R. 60 & 61 W., Crook County.
 SURFACE FORMATION: Mowry.
 STRUCTURE: Small anticline.
 REMARKS: Tested dry by the Roxana Petroleum Company. No information available.

Clark Dome

(Bates Hole District)

LOCATION: T. 31 N., R. 81 W., Bates Hole District, Natrona County.
 SURFACE FORMATION: Niobrara.
 STRUCTURE: Dome; poor exposures.
 REMARKS: Untested. A well off structure, in 23-31-81, encountered water in the Embar at 1875'. There is a U. S. G. S. Press Bulletin on this area.

Coal Creek

LOCATION: T. 35 N., R. 77 W., Converse and Natrona Counties.
 SURFACE FORMATION: Niobrara.
 STRUCTURE: Dome.
 REMARKS: A well drilled on structure, in 27-35-77, found the Muddy sand dry at 1555'. Hole abandoned at 2340'.

Cody (Shoshone)**Colter**

LOCATION: T. 46 N., R. 93 W., Southern Big Horn Basin, Washakie County.
 SURFACE FORMATION: Fort Union.
 STRUCTURE: Anticlinal nose.
 REMARKS: Empire State Oil Company, in 16-46-93, abandoned a test of the structure at 2531'.

Como Ridge

LOCATION: T. 22 N., R. 77 W., Southern Wyoming. Albany and Carbon Counties.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Broad plunging anticline.
 REMARKS: A test of the structure encountered water in the Tensleep.

Colony

LOCATION: T. 57 N., R. 62 W., Northeast corner of Wyoming, Crook County.
 SURFACE FORMATION: Mowry.
 STRUCTURE: Dome.
 REMARKS: The Wyoming Exploration Company found water in 47' of Dakota at 243' and in the Tensleep at 2000'. The Roxana Petroleum Company, in the SE $\frac{1}{4}$ of 27-57-61, abandoned a hole at 2290'. Log of well not available.

Conant Creek

LOCATION: T. 32 & 33 N., R. 94 W., Central Wyoming. Fremont County.
 SURFACE FORMATION: Morrison.
 STRUCTURE: Anticline pitching to the North; axis sinuous and faulted.
 REMARKS: Possible producing sands eroded; not favorable.

Cooper Cove

LOCATION: T. 18 N., R. 78 W., Southern Wyoming, Carbon County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Much faulted anticline.
 REMARKS: Utah Oil Refining Company, in 20-18-77, lost its well at 4575', having failed to reach the Muddy sand. Believed to have been off structure. The Ohio Oil Company, in 19-18-77, failed to reach the Muddy sand at 5380' and abandoned the well.

Cottonwood

(See Hamilton Dome)

Cottonwood Creek

LOCATION: T. 36, 37 & 38 N., R. 84 & 86 W., Natrona County.
 SURFACE FORMATION: Chugwater with escarpment of Sundance, Dakota and Frontier.
 STRUCTURE: Anticline plunging from the Big Horn Mountains; not closed.
 REMARKS: One well encountered warm sulphur water in the lower Cretaceous. Henderson Oil Company, in 20-38-85, found water in the bottom of the Embar at 1850'. Unfavorable.

Cow Gulch

(See Old Woman Creek)

Crooked Creek

LOCATION: T. 58 N., R. 96 W., Northern Big Horn County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Small dome.
 REMARKS: Favorable. Not tested through the black oil series.

Crooks Gap

LOCATION: T. 28 & 29 N., R. 92 & 93 W., Southern Fremont County.

SURFACE FORMATION: Steele and Niobrara.

STRUCTURE: Small elongated dome with steep dips. Faulted.
REMARKS: The Southwestern Petroleum Company, in 7-28-93, developed a small gas well in the Frontier and found the Dakota missing at 2495', where the well was abandoned. Off structure. Producers & Refiners Corporation, in Section 13-28-93, found oil in the first Wall Creek sand, 2495'-2573', 30 barrels. This well was completed in July, 1925. Two other tests by same company were dry. Premier Oil Company now drilling Southwest corner SE of SE of Section 7-28N-92W.

Crystal Creek

LOCATION: T. 54 N., R. 93 W., Big Horn County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Anticline, curved crest, about 6 miles long.

REMARKS: Tensleep productive of 20.4° gravity oil. Uncommercial black oil field. Cosden & Company drilled a number of shallow wells on the structure in 1918, which were productive of black oil in the Tensleep.

Cumberland

LOCATION: T. 19 N., R. 116 W., Northern part of Uinta County.

SURFACE FORMATION: Frontier.

STRUCTURE: Sharp faulted anticline.

REMARKS: Cumberland Oil Syndicate testing in NW¼ of 32-19-116, could not get a water shut-off at 2070' and have practically abandoned.

Dad

LOCATION: T. 16 N., R. 92 W., Southwestern Carbon County.

SURFACE FORMATION: Wasatch.

STRUCTURE: Monocline. Sometimes called Muddy Creek Monocline.

REMARKS: Some oil found in wells drilled on West slope of monocline.

Dallas and Derby Domes

(Part of Lander Field)

LOCATION: T. 32 N., R. 99 W., on Popo Agie Creek, South of Lander, Fremont County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Superimposed domes on the Shoshone anticline.

REMARKS: Black oil of 20.2 gravity from the Embar. The field is rated as an important black oil producer. The Dallas Dome Wyoming Oil Fields Co., controls the field and has a pipe line to Wyopo, a station on the C. & N. W. R. R., where it loads its oil for shipment to Casper. This company has 42 wells producing an average of 200 barrels per day.

This structure is cut by a strike fault in Secs. 18, 19, 20, 29, 32 with a throw of 900'. Also several small faults. The first discovery of oil in Wyoming was made in 1883 in the Dallas district. This discovery was in the form of a tar spring discovered by Captain Bonneville. (See Wyoming Geological Survey

Bulletin 2, Series B.) Deeper penetration into the Tensleep sand the past year has greatly increased production.

Danker Anticline

(See Big Pole Cat)

Dewey

LOCATION: T. 42 N., R. 60 W., North of Mule Creek field, Weston County.

SURFACE FORMATION: Niobrara.

STRUCTURE: Dome.

REMARKS: Carter Oil Co. tested in 36-42-60, Lakota sand at 3636', dry.

Douglas Oil Field

LOCATION: T. 32 & 33 N., R. 73 & 74 W., ten miles west of Douglas, Converse County.

SURFACE FORMATION: White River.

STRUCTURE: Monoclinial with perhaps a nose. Accumulation is due to the clay of the White River formation which lies on the upturned edges of the Colorado, Montana, and older formations. The Wyoming Geological Survey Bulletin 3-A, Series B, states that the structure is anticlinal and highly faulted while the U. S. G. S. Bulletin 541 states that the structure is monoclinial.

REMARKS: Productive horizons are Lower Benton, Upper Cloverly, top of Casper and White River. Some 40 wells have been completed with indifferent results. Uncommercial field. Several seeps in vicinity of field.

Dry Dome

(Also known as Eight Mile)

LOCATION: T. 51 N., R. 92 W., Eight miles southeast of Basin in the Big Horn Basin; Big Horn County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Small closed dome.

REMARKS: This dome was drilled in 1914 in the NE¼ NW¼ of 2-50-92. The well tested all sands through the Greybull to a total depth of 1800'. All sands contained water. (See U. S. G. S. Bulletin No. 656.) Not favorable for deep test.

Dry Piney

(See Big Piney)

Dugout Creek

(See West Salt Creek)

Dutton Basin

LOCATION: T. 33 & 34 N., R. 90 W., Fremont County.

REMARKS: Contains the following structure, which see: Dutton Dome, Muskrat Dome and Puddle Springs.

Dutton Dome

(Part of Dutton Basin)

LOCATION: T. 34 N., R. 90 W., Fremont County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Unclosed dome.

REMARKS: For development see Muskrat Dome.

East & West Buffalo Basin

LOCATION: T. 47 & 48 N., R. 99 & 100 W., West side of the Big Horn Basin. Thirty-four miles southeast of Cody, Park County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Domes on anticlines. Unfaulted.

REMARKS: This structure was first tested in 1913. Three wells on the limbs of the folds reached the Frontier at from 1370-1455'. The first and second Frontier sands are water-bearing but gas, under great pressure, was found in the third and fourth Frontier sands. Rated as an important commercial gas field. Gas supply for towns in the Big Horn Basin. See Wyoming Geological Survey Bulletin 11, U. S. G. S. Bulletin No. 656.

East Byron

LOCATION: East side of Byron Field. Big Horn County.

SURFACE FORMATION: Mesa Verde and Cody.

STRUCTURE: Dome with 500' of closure; separated from Byron dome by saddle.

REMARKS: Possible productive sand would be the Frontier. For development see Byron Dome and Garland.

Eight Mile Dome

(See Dry Dome)

Eight Mile Lake

(See Lake Valley)

East Foote Creek

LOCATION: T. 21 N., R. 76 W., Albany County.

SURFACE FORMATION: Niobrara.

STRUCTURE: Closed anticline? E. L. Estabrook of the Midwest Refining Company, who first worked the structure, says it is closed.

REMARKS: A well drilled by Dutton Creek Oil & Gas Company, in 21-21-76, was abandoned at 1034', possibly off structure.

Elk Basin

LOCATION: T. 58 N., R. 100 W., Northern Big Horn Basin, partly in Montana and in Park County, Wyoming.

SURFACE FORMATION: Cody Shale.

STRUCTURE: Much faulted dome.

REMARKS: Discovered in October, 1913. Productive sands are the Torchlight and Peay (Frontier) 1070' and 1280'. Rated as an important oil field. Was producing an average of 750 barrels per day from 144 wells at the close of 1929. The oil produced is of high grade and has an average gravity, on the Beaume Scale, of 43 degrees. Several favorable sands still untested. Oil from this field is delivered to the refinery at Greybull through the lines of the Illinois Pipe Line Company. See U. S. G. S. Bulletin No. 656.

Elk Mountain

LOCATION: T. 20 N., R. 81 W., Southern Wyoming, Carbon County.

SURFACE FORMATION: Steele.

STRUCTURE: Plunging anticline open to the south.

REMARKS: Kasoming Oil Company found no sands to 4225' in a well drilled in 4-20-81. This well was drilled in a fault where the beds were practically vertical. No test. Structure is unfavorable.

Embar

LOCATION: T. 8 N., R. 2 & 3 W., of the Wind River Meridian, Fremont County.

SURFACE FORMATION: Embar.

STRUCTURE: Eroded anticline.

REMARKS: Tested by Mexico-Wyoming Oil Company in the NE $\frac{1}{4}$ of 6-8N-3W to 3056'.

Emigrant Gap Anticline

LOCATION: Trends NW from the Casper fault just west of Casper, Natrona County.

STRUCTURE: Anticline 24 miles long. Ten miles east of and parallel to Pine Dome and Oil Mountain structures. The northern part is a minor upfold and has good possibilities. The southern part is eroded too deeply. Structure contains three domes as follows, which see: Virginian Dome, Triangulation Dome and Place Dome.

Enos Creek

LOCATION: T. 46 N., R. 100 W., Southern Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Dome with 600' of closure; mountainward fold.

REMARKS: Unsuccessfully tested in the first Frontier in 1916. Producers and Refiners Corporation in 26-46-100, developed ninety million cubic feet of gas in the lower Frontier sands. This well found the Dakota sand water-bearing. Rated as an important gas field.

Ferris Dome

(Part of Lost Soldier District)

LOCATION: T. 26 N., R. 86 & 87 W., Southern Wyoming, Carbon County.

SURFACE FORMATION: Steele and Niobrara.

STRUCTURE: Closed dome on Lost Soldier anticline.

REMARKS: The Benton, Mowry and the Muddy all produce oil. Gas and a little oil of 31 degrees gravity in the Sundance. Rated as an important oil and gas field. The Producers & Refiners Corporation, drilling on the structure in NW SE recently, found a commercial light oil producer in the Embar at 4526. This is the first paraffin base oil found in formations below the red beds. However, after producing a few weeks, water encroachment made it necessary to plug off this sand and produce from a sand in the Chugwater.

Fidler Creek

LOCATION: T. 45 & 46 N., R. 64 & 65 W., Weston County.

SURFACE FORMATION: Pierre, Fox Hills and Lance.

STRUCTURE: Anticline; two separate domes. Approximately 1200 acres inside of the closing contour.

REMARKS: J. H. O'Brien et al., test on Section 11-45-64, abandoned.

Flat Top

LOCATION: T. 24 N., R. 77 W., Albany and Carbon Counties.
 SURFACE FORMATION: Amsden.
 STRUCTURE: Eroded dome.
 REMARKS: Producers & Refiners Corporation, in Section 28-24-77, had a hole full of water from 1000' to 1020'.

Fontenelle

LOCATION: Lincoln County.
 SURFACE FORMATION: Adaville.
 STRUCTURE: Faulted anticline.
 REMARKS: Untested. Carboniferous possibilities.

Foot Creek

(See East and West Foot Creek)

Fort Steele

(See Picnic Ground)

Fossil

LOCATION: T. 21 N., R. 117 W., Southwestern Wyoming, Lincoln County.
 SURFACE FORMATION: Wasatch.
 STRUCTURE: ?
 REMARKS: Light oil showings in the Aspen in sand lenses. Uncommercial oil field, extensively exploited for many years.

Four Bear

LOCATION: T. 47 & 48 N., R. 102 & 103 W., West side of Big Horn Basin, Park County.
 SURFACE FORMATION: Lowest part of Mowry.
 STRUCTURE: Anticline 12 miles long. Mountainward fold.
 REMARKS: C. C. Landis Company, in 16-47-102, was probably through the Cloverly at 1200'. A well drilled on the structure to 1700' was in the Embar and dry. See U. S. G. S. Bulletin No. 656.

Frannie

LOCATION: One mile west of Frannie, in T. 58 N., R. 98 W., Northern Big Horn Basin, Big Horn County.
 SURFACE FORMATION: Frontier.
 STRUCTURE: Narrow anticline crossed by fault running northeast.
 REMARKS: The Ohio Oil Company tested to 2400' with the following results: 14' of Greybull or Dakota at 1135'. Water in the Morrison at 1345'. Resenberg last summer, in NE NW NW of 25-58-98, completed a 200-barrel well in Embar 2583' to 2600', testing 29 gravity. Several tests now drilling. Midwest completed two good producers in the Tensleep and their best producer in the top of the Madison lime.

Freeland Dome

(Bates Hole District)

LOCATION: Section 34-31-80, Natrona County.
 SURFACE FORMATION: Chugwater 300' to 400' exposed at surface.
 STRUCTURE: Plunging anticline.
 REMARKS: No development. Unfavorable.

Freezeout Hills

LOCATION: T. 24 & 25 N., R. 78 & 79 W., Carbon County.
 SURFACE FORMATION: Tensleep.
 STRUCTURE: Anticline.
 REMARKS: Stratigraphically unfavorable for formation or accumulation of oil or gas.

Frost Ridge

LOCATION: T. 50 N., R. 101 W., on west side of Big Horn Basin, 20 miles south of Cody, Park County.
 SURFACE FORMATION: Upper part of Mesa Verde (Eagle).
 STRUCTURE: Small circular dome, one mile in diameter. Unfaulted.
 REMARKS: Untested. Not very favorable on account of great depth to possible producing sands. (Frontier would lie at about 2500'.) See U. S. G. S. No. 656.

Garland

LOCATION: Extends across the Shoshone River one mile above Byron. May be the same as Byron, which see. Big Horn County.
 SURFACE FORMATION: Cody shale.
 STRUCTURE: Narrow anticline several miles long; highly faulted.
 REMARKS: Producers & Refiners Corporation, in 30-56-97, tested through the Tensleep at 2123'. Allen Oil Company has a rig up in the SE $\frac{1}{4}$ of 10-56-98. The California Company of Montana, in the SE $\frac{1}{4}$ of 10-55-97, reached a total depth of 4390' in its deep test. An excellent showing of light green oil was encountered in this well in the Muddy sand from 3865' to 3869'. The Utah Southern Oil Company is drilling on the SE $\frac{1}{4}$ of 29-56-97; and Ohio Oil Company, drilling in 33-56-97, got 25 million gas in the Embar at 3040', and completed for 40 million gas at 3161'. Same company now drilling below 4600' in northeast corner NE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 22-56-97.

Geary Dome

LOCATION: Just west of the Big Muddy field, Natrona County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Dome; not closed.
 REMARKS: The Inland Oil Company, in 32-34-77, encountered water in the first Wall Creek sand at 4878'. The well was abandoned at 4897'.

Gebo

LOCATION: T. 44 N., R. 95 W., Southern Big Horn Basin, Hot Springs County.
 SURFACE FORMATION: Cody shale.
 STRUCTURE: Broad anticline; faulted.
 REMARKS: The Mountain States Oil Company tested this structure at a location in the SW corner of the NE $\frac{1}{4}$ of 23-44-95. The Frontier sands were water-bearing and the Muddy sands at 2275' produced a small amount of gas estimated at less than a million cubic feet. The Greybull sand, 2690-2740', contained water. Dakota series was all water-bearing and the well was abandoned at 2902' through the Morrison. Another test of this anticline was drilled last summer by Gebo Consolidated Oil Company in Northeast corner of SW $\frac{1}{4}$ SE $\frac{1}{4}$ of Section 23-44-95, had a light oil showing at 895 and shut down for the winter at 1350'.

Gillette

LOCATION: T. 50 N., R. 72 W., four miles north of Gillette, Campbell County.
 SURFACE FORMATION: White River.
 STRUCTURE: Northwest southeast plunging anticline, 8 miles long, 4 miles wide.
 REMARKS: Wall Creek sands would be reached at about 2400'. The C. B. & Q. R. R., in 22-50-72, encountered an artesian flow of water at about 1500'.

Gillispie Anticline

LOCATION: 16 miles northeast of the town of Rock River, Albany County.
 SURFACE FORMATION: Cretaceous down to Pennsylvanian.
 STRUCTURE: Anticline plunging to the southwest. Open to the northeast.
 REMARKS: Tested. Dry. No trap for oil being present.

Glendo

LOCATION: T. 29 N., R. 67 W., near the town of Glendo, Platte County.
 SURFACE FORMATION: Morrison.
 STRUCTURE: Monocline.
 REMARKS: The Nebraska Oil Company, in 20-29-68, abandoned a well at 1650'. This well was in the Sundance at 350'. Artesian Water was developed in the Tensleep at 1400'. This dry hole has been taken over by the Associated Oil Company of Nebraska and an attempt will be made to deepen it, at some time in the future.

Golden Eagle Dome

LOCATION: T. 45 N., R. 97 W., 20 miles north of Thermopolis, Big Horn Basin, Hot Springs County.
 SURFACE FORMATION: Lance.
 STRUCTURE: Covered terrace with fault on west side.
 REMARKS: 7 gas sands are productive. In the Mesa Verde and through the Frontier. Rated as an important gas field. 90 million cubic feet of gas developed. 8 gas wells have been completed. This field supplies gas to Thermopolis for domestic use.

Gooseberry Dome

LOCATION: Sections 15, 16, 21 & 22, T. 47 N., R. 100 W., Park County.
 SURFACE FORMATION: Pierre, escarpment of Mesa Verde.
 STRUCTURE: Dome with 800' of closure. Unfaulted.
 REMARKS: This structure tested by the Prairie Oil & Gas Co. in 32-47-100. The Frontier sands from 2025' to 2062', were water-bearing. Cloverly series also carried water and the test was abandoned at 3802'. This structure is closely associated with the Gooseberry Anticline.

Gooseberry Anticline

LOCATION: T. 46 & 47 N., R. 100 W., Park and Hot Springs Counties.
 SURFACE FORMATION: Pierre, escarpment of Mesa Verde.

STRUCTURE: Anticline three miles long with 800' of closure. Unfaulted.

REMARKS: A well drilled several years ago in NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$ of 29-47-100, by the Washakie Oil Company, found water in the Torchlight sand at 2080' to 2120'. A show of black oil was found in a sand from 2425' to 2500' where the hole was abandoned. Structural map in U. S. G. S. Bulletin No. 656.

Goose Egg

Location: T. 32 N., R. 81 W., Natrona County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Steeply plunging anticline, open towards the Laramie Mountains.
 REMARKS: Aurora Consolidated Oil Company, in 15-32-81, abandoned a well at 150'. No test. Not considered favorable. Described on page 265 of U. S. G. S. Bulletin 641-I.

Gose Dome

LOCATION: T. 47 N., R. 65 W., on Soda Creek, Weston County.
 SURFACE FORMATION: Pierre.
 STRUCTURE: Dome.
 REMARKS: Gose Oil Syndicate drilling in 28-47-65, abandoned at 4865'. This district received considerable geophysical work last summer.

Goshen Hole

LOCATION: T. 22 N., R. 61 W., Goshen County.
 SURFACE FORMATION: Laramie.
 STRUCTURE: ?
 REMARKS: Foreman Oil Company drilled a well to 5281' without results.

Gothberg

LOCATION: T. 36 N., R. 82 W., Natrona County.
 SURFACE FORMATION: Pierre shale.
 STRUCTURE: Open anticline, plunging southward. Closely associated with North Casper Creek Dome.
 REMARKS: The Elkhorn Oil Company, in 32-36-82, found 184' of Frontier sand dry at 1390'. This structure is not fully tested but as it is not closed, it cannot be considered favorable.

Government Hill

LOCATION: 8 miles west of Salt Creek. Natrona County.
 SURFACE FORMATION: Frontier.
 STRUCTURE: Plunging anticline.
 REMARKS: The Comet Oil Company, in 31-40-80, developed a million cubic feet of gas in Wall Creek at 1414', and a million and a half in the Dakota at 1520'. The well was abandoned at 2050'. Vernon Oil Company, in 5-39-80, found the second Wall Creek dry at 752', and abandoned the hole at 790'.

G-P Dome

LOCATION: T. 25 N., R. 86 W., Carbon County.
 SURFACE FORMATION: Dune sand underlain by Steele shale.
 STRUCTURE: Plunging anticline, closely associated with the Ferris dome.

REMARKS: The producing sands are sand lenses near the base of the Niobrara. The General Petroleum Company has two wells producing and two drilling to test Frontier sands. One of these is in 16-25-86. It reached the top of the first Wall Creek sand at 4635' and abandoned at 5400'.

Grenville

LOCATION: T. 21 & 22 N., R. 85 & 86 W., Carbon County.

SURFACE FORMATION: Mowry.

STRUCTURE: Anticline plunging eastward.

REMARKS: Producers & Refiners Corporation, in 28-21-86, encountered flowing black sulphur water in the Tensleep from 2210' to 2239'. Other tests of the structure were dry. The Fort Steele Petroleum Company, NE¼ of NW¼ of 22-21-85, was dry at 3640'. Ed Goode, 36-22-86, reached a total depth of 1920', and had a show of oil in the Steele shale. P. & R. drilling in 9-21-84, abandoned at 700'.

Grass Creek

LOCATION: T. 45 & 46 N., R. 98 & 99 W., west side of the Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Cody shale, Eagle sandstone on flanks.

STRUCTURE: Closed structure, ten miles long and three miles wide, with 1800' of closure. The axis curves from west to north-west and then to the north. Faulted.

REMARKS: Oil is produced from three sands of the Frontier, gas from the Muddy sands and black oil from the Embar, Tensleep and Morrison. The first well was drilled in 1913, and the first oil discovered in 1914. Light oil of 43 degrees gravity is produced from the three sands in the Frontier at depths from 500' to 1200', and black oil series at depths below 3600'. The oil from this field is delivered to the plant of the Standard Oil Company of Indiana, at Greybull, through the lines of the Illinois Pipe Line Company. Several wells completed through to the Muddy sand are big gas producers. Black oil is produced from the Morrison, Embar and Tensleep. Nine wells have been completed through these sands, which sands have a combined thickness of from 500' to 600'. The wells average about 400 barrels per day each of oil of the gravity of 26½ degrees. The Grass Creek Field ranks as the fifth largest field in Wyoming. The limits of the field are well defined. Structural map in U. S. G. S. No. 656. See also Bulletin, Wyoming State Geologist No. 11, Part 2, by Hintze.

Graybeal (Same as Carter Dome)

Greybull

LOCATION: T. 52 N., R. 93 W., Big Horn County.

SURFACE FORMATION: Mowry.

STRUCTURE: Dome with 200' closure. Faulted. Originally known as Peay Hill.

REMARKS: Gas was discovered in the top of the dome in the year of 1907. Oil was found on the sides. In 1916, the field produced an average of 3000 barrels of oil daily. Present production from 21 wells is 20 barrels per day. Depth is from 800' to 1100', according to structural location. Producing horizon is the Greybull sand at the base of the Thermopolis. This sand is ap-

proximately 20' thick. The oil is of 41.1 degrees gravity and has paraffin base. See Bulletin, Wyoming State Geologist No. 10, and the U. S. G. S. Bulletin No. 656. Possible commercial production in Tensleep.

Hale Dome

LOCATION: T. 42 N., R. 93 W., 12 miles east of Thermopolis, Hot Springs County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Small anticline pitching northward from Bridger Mts. 3 miles long.

REMARKS: The Union Oil Company of California, in 3-42-93, abandoned a test through the Amsden at 2,068'.

Half Moon

LOCATION: T. 51 N., R. 102 W., west side of the Big Horn Basin, 8 miles southeast of Cody, Park County.

SURFACE FORMATION: Mowry.

STRUCTURE: Anticline three miles long with large strike fault along its crest. Mountainward fold. The fault may have caused accumulation in the Cloverly.

REMARKS: Untested. See U. S. G. S. Bulletin No. 656.

Hamilton Dome

(Cottonwood)

LOCATION: T. 44 N., R. 97 & 98 W., Southern Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Mowry.

STRUCTURE: Dome 7 miles long with 2000' of closure. Cut by several small faults.

REMARKS: The producing sands are the Chugwater and the Embar. 27 wells have a daily average of 1200 barrels. The oil produced from the middle Chugwater and Embar; U. S. G. S. Bulletins place the depth to the top of the Chugwater at from 950' to 1000'. In actual drilling operations the top of the Chugwater has been found at 1445' on the crest of the dome. The Embar lies at approximately 2500'. The oil from the Chugwater has a gravity of 19 degrees while the oil from the Embar has a gravity of 26.3 degrees. The oil from Hamilton Dome Field is refined at the Greybull plant of the Standard Oil Company of Indiana. Rated as one of the more important black oil fields of the state. See U. S. G. S. Bulletins Nos. 711 and 656.

Hiawatha Dome

LOCATION: T. 12 N., R. 99 to 100 W., Sweetwater County.

SURFACE FORMATION: Wasatch.

STRUCTURE: Fold in the Tertiary. Asphaltum oil found in seeps.

REMARKS: Ohio got 44 million gas in SE corner of 24-12-100 in sand 2220'-2240', and several tests are now drilling in this locality.

Hidden Dome

LOCATION: T. 47 & 40 N., R. 90 W., southeast side of the Big Horn Basin, Washakie County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Terrace, anticlinal. Eagle sandstone escarpment on north and southwest sides.

REMARKS: Sands in the Frontier at 1220', 1325' and 1500' produce gas. Deeper sands untested. A pipe line to Greybull and Basin delivers 50 million cubic feet of gas per day to these towns for local consumption and for use under the boilers in the plant of the Standard Oil Company of Indiana at Greybull. The field is controlled by the Ohio Oil Company. Favorable for deep test. Ohio started deep test in NW 31-48-90, but have suspended operations.

Horse Creek

LOCATION: T. 16 N., R. 70 W., southeastern Wyoming, Laramie County.

SURFACE FORMATION: Pierre.

STRUCTURE: Open anticline.

REMARKS: Boucher, Holmes and Drayton, in 1-16-70, encountered water in the Muddy sand at 2660', and abandoned the hole. Carter Oil Company got artesian water at 2975' and abandoned at 3216', in NW ¼ of 36-17-70.

Horse Track

(See Picket Lake)

Horse Shoe

(Same as Muskrat Dome)

Horton

LOCATION: T. 43 N., R. 89 W., southern Big Horn Basin, Washakie County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Dome, closely associated with Mahogany Butte.

REMARKS: The Ohio Oil Company, in 7-43-89, encountered water from 1873' to 1979'.

Hjorth Dome

(See Medicine Bow)

Hudson Field

LOCATION: T. 2 S., R. 1 & 2 East of the Wind River Meridian, Fremont County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Much faulted anticline, part of Shoshone anticline.

REMARKS: Oil is produced from the Embar at depths ranging from 1000' to 1250'. During 1925 several of the old wells were deepened and a new pay sand was encountered in the Embar, probably near the base at about 1700'. 34 wells produce an average of 50 barrels daily of oil of a gravity of 22.2 degrees. This oil has been sold to the Chicago & Northwestern R. R. for fuel oil for many years. Last year two of the wells were carried into the Tensleep and found about 500 barrels of which about 30% was water.

Ilo Ridge

LOCATION: T. 44 N., R. 97 W., Hot Springs County.

SURFACE FORMATION: Lower Cody shale.

STRUCTURE: Anticline 7 miles long pitching steeply to the northwest; unfaulted.

REMARKS: Four wells have been drilled on the structure without results. One of these gives the following sand records: Show of oil in the Frontier at 305'; water in the sand Frontier at 568'; show of oil in the Muddy at 1295'; water in Dakota at 1595'; dry in the Morrison at 1838', and dry in the Tensleep at 2000'. See U. S. G. S. Bulletin No. 556.

Ionia

LOCATION: On north bank of Shoshone River, 8 miles NE of Lovell; Big Horn County.

SURFACE FORMATION: Lower Colorado.

STRUCTURE: Anticline cut by several normal faults.

REMARKS: Unsuccessfully tested through the Chugwater.

Indian Creek Dome

LOCATION: T. 36 N., R. 61 W., Niobrara County.

SURFACE FORMATION: Pierre shale.

STRUCTURE: ?

REMARKS: Blacktail-Wyoming Oil Company completed a dry hole to 2340', 35-35-61; off structure.

Iron Creek

LOCATION: T. 32 N., R. 82 W., Central Wyoming, Natrona County.

SURFACE FORMATION: Frontier.

STRUCTURE: Dome with small closure.

REMARKS: The New York Oil Company has a few wells capable of producing a small amount of black oil of 28 degrees gravity from the Sundance at 1430'. The entire field is owned and controlled by the New York Oil Co. Black oil and no market.

Irvine

LOCATION: T. 31 N., R. 70 W., Converse County.

SURFACE FORMATION: Fox Hills.

STRUCTURE: Dome.

REMARKS: Unfavorably tested through the Wall Creek sand in 21-31-70.

James Lake

LOCATION: T. 17 N., R. 76 W., northwest of Laramie on the flanks of the Medicine Bow Range, Albany County.

SURFACE FORMATION: Mesa Verde.

STRUCTURE: Wide structure of slight dips. Probably slump dips.

REMARKS: Cactus Petroleum Company, in 32-18-75, abandoned a test at 3345'.

Kaycee Dome

LOCATION: T. 42 & 43 N., R. 82 W., Johnson County.

SURFACE FORMATION: Morrison.

STRUCTURE: Closed anticline; faulted.

REMARKS: Cleveland Wyoming Oil Company, abandoned a test at 1800' on account of a bad hole. No test. Has some possibilities of shallow light oil where Dakota has faulted down. Also has possibilities of black oil production. C. L. Sackett is testing in the SE ¼ of 4-43-82, and R. C. Tarrant also drilling in same section.

Kelly

LOCATION: T. 8 N., R. 3 E. of the Wind River Meridian, Fremont County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Dome.

REMARKS: In 36-8-3, the Glencross Oil Company found water in the Embar at 1080'.

King Dome

LOCATION: 12 miles northeast of Thermopolis on the Thermopolis anticline and near the Waugh anticline (Ilo Ridge), Hot Springs County.

SURFACE FORMATION: Chugwater.

STRUCTURE: Dome.

REMARKS: A well drilled in 27-44-96 found a little oil in the Embar. The Tensleep was thin.

Kirby Creek

LOCATION: T. 43 N., R. 92 W., southern Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Small structure three miles long.

REMARKS: The Ohio Oil Company completed a few small wells in the second Wall Creek sand at 300'. Uncommercial light oil field. Controlled by the Ohio Oil & Gas Company.

LaBarge Field

LOCATION: T. 27 & 28 N., R. 113 & 114 W., western Wyoming; about 80 miles north of Spring Valley, Sublette County.

SURFACE FORMATION: Adaville.

STRUCTURE: The Darby fault brings the upper Cambrian in contact with Montana shales. East of the fault lies the axis of a low anticline.

REMARKS: Oil is believed to come from sandy layers in the Tertiary. Fifty-six producing wells are making an average of 1500 barrels per day. The oil is of an average gravity of 32 degrees and while of paraffin base, contains practically no gasoline. Productive area owned by Texas Production Company. Midwest last fall completed 4" pipe line from the field to railhead at Opal. The oil goes to the Utah Oil Refinery at Salt Lake City.

La Flamme

LOCATION: T. 56 N., R. 60 & 61 W., Crook County.

SURFACE FORMATION: Mowry.

STRUCTURE: Small unfaulted anticline.

REMARKS: Tested dry.

Lake Creek

LOCATION: T. 43 N., R. 91 & 92 W., Hot Springs County.

SURFACE FORMATION: Frontier.

STRUCTURE: Narrow anticline nine miles long with 1600' of closure.

REMARKS: Paul Stock abandoned a test well at 950'. Off structure. Discovery well of this structure, on the NW $\frac{1}{4}$ of 34-43-91, was completed by the Union Oil Company of California, October 24, 1925, in the Embar sand from 2715' to 2720'. The well had

initial production of 600 barrels of 25.5 degrees gravity oil. As there are no pipe lines to this field, the discovery well has been shut in. Two new wells were immediately started, and completed in the fall of 1926 for approximately 500 barrels.

Lake Hattie (Strom)

LOCATION: T. 15 N., R. 76 W., Laramie Basin, Albany County.

SURFACE FORMATION: Steele shale.

STRUCTURE: Slightly terraced.

REMARKS: Centennial Valley Oil Company drilled a well in 30-15-76. A showing of oil was encountered at 2005'; water in the Muddy sand at 2938'; a showing of oil in the top of the Dakota at 3108' and water in the bottom. Abandoned at 3200'.

Lake Valley

(Same as 8 mi. Lake)

LOCATION: T. 20 N., R. 88 W., Carbon County.

SURFACE FORMATION: Steele.

STRUCTURE: Anticline three miles long.

REMARKS: Large gas wells developed on this structure by the Hatfield Oil Company. The field is connected to the refinery of the Producers & Refiners Corporation at Parco by a six-inch pipe line and the gas is used under the boilers at the plant. Producers & Refiners now deepening gas wells for possible oil sands.

Lamb Anticline

LOCATION: T. 51 N., R. 92 & 93 W., east side of the Big Horn Basin, Big Horn County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Anticline 3 miles long with relatively low dips, 200' of closure. Associated with Torchlight Dome, being separated from it by a shallow syncline. No record of faults.

REMARKS: The first test of this structure was made in 1907 when a dry hole was completed. The first gas well was completed in 1913, and the first "heavy" oil well in 1914. The gas sand is the Peay sand at 500' to 900', and Greybull. Several dry holes on the structure. This structure was tested through the Greybull sands (Cloverly) at 2100'. The structure still holds possibilities as a black oil prospect, at approximately 3500'. Formerly the gas supply for Greybull and Basin was secured from wells on this structure.

Lance Creek Field

LOCATION: T. 35 & 36 N., R. 65 & 66 W., Niobrara County.

SURFACE FORMATION: The lowest exposed rocks are 1650' below the top of Pierre.

STRUCTURE: Anticline 18 miles long, situated on the north side of Hartville uplift. The axis is in the form of a double reverse curve; it pitches to north and east and closes to southeast.

REMARKS: The Wall Creek sands at 2250' are not generally productive. The principal productive sand is the Newcastle (Muddy) which is found at 3300' to 4000'. It produces some gas. The first break in the Dakota, at places in the field, produces gas and some oil at very high gravity. Near the close of 1925, the Ohio Oil Company, in the SW $\frac{1}{4}$ of Section 35-36-65, encountered oil in the second break in the Dakota from 3630' to 3638'. The

well had initial production of 45 barrels per hour. Rated as an important light oil field. 27 wells have a daily average production of 750 barrels. Structural map in U. S. G. S. Bulletin No. 716-E.

Lander Oil Field

LOCATION: Central Fremont County.

GENERAL STRUCTURE: The main fold, which includes the Dallas and Derby domes, the Hudson fields, Plunkett and Sage Creek dome, is 39 miles long and from 3 to 11 miles wide. The crest undulates and the structure is complicated by faults in the southern district, and by a spur from the main fold in the Little Wind River district.

REMARKS: This field is divided into three parts which consist of the Dallas and Derby domes, the Hudson field and Sage Creek. In early reports and bulletins, these divisions were referred to as Little Popo Agie, Big Popo Agie, and Little Wind River. These fields are all a part of the Shoshone Anticline. The Plunkett field is also on the Anticline, and is located between the Hudson field and Sage Creek. Descriptions of the separate fields will be found in this summary under appropriate headings. The first commercial oil well in Wyoming was completed on the Dallas dome in 1863. A full report of the early development of the field is contained in the Bulletin of the Wyoming State Geologist No. 2, by C. E. Jamison. Excellent structure map is contained in U. S. G. S. Bulletin 452.

Lane Dome (See Notches)

Little Buffalo Basin

LOCATION: T. 27 N., R. 95 W., Southern Fremont County.

SURFACE FORMATION: Benton.

STRUCTURE: Eastward steeply pitching anticline, and several small domes.

REMARKS: Sage Creek Petroleum Company developed 55 million cubic feet of gas in the Frontier at 875' to 889' in the SW $\frac{1}{4}$ of 17-27-95. Prairie Oil & Gas Company has 2 wells in the district to establish the positions of the domes. Each of the tests showed some oil and several gas sands with unusual low rock pressure.

Little Pole Cat

LOCATION: Near Frannie in northern Big Horn County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Small dome.

REMARKS: A small gas well has been completed in the Frontier; shut in.

Little Grass Creek

LOCATION: T. 46 N., R. 99 W., western Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Nearly circular dome, one and one-half miles in diameter; faulted.

REMARKS: Well near the crest encountered water in the upper part of the Frontier. Another well encountered 40 million cubic feet of gas in the lower Frontier, which is piped to Thermopolis for domestic use. Ohio now drilling southeast corner of SE $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 8-46N-99W.

Little Lost Soldier

LOCATION: Northeast part of T. 26 N., R. 90 W., Sweetwater County.

SURFACE FORMATION: Niobrara and Steele shale.

STRUCTURE: Dome on Lost Soldier anticline. Faulted.

REMARKS: The field is producing from the Mowry, Frontier, Benton and Dakota. Most of the production comes from the Dakota. Field was discovered in 1916. The productive area covers 640 acres. 75 wells completed have a combined capacity of 4000 barrels daily of an average gravity of 32 degrees. Frontier oil is 31.4 gravity. Bulletin 756 of the U. S. G. S. states that the production is mainly from the Muddy sand at 1375' and that there seems to be an inter-communication between the Frontier and Muddy sands due to faulting.

Lingle

(See Rawhide Butte)

Lost Soldier

LOCATION: Northwestern Carbon County and northeastern Sweetwater County.

STRUCTURE: Anticline 22 miles long with 3000' of closure, on which the following domes are located: Little Lost Soldier, Wertz, Mahoney, Ferris and Sherrard. These fields are described under separate headings, which see.

Lost Creek

LOCATION: T. 25 N., R. 95 W., Sweetwater County.

SURFACE FORMATION: Steele.

STRUCTURE: Closed anticline.

REMARKS: The Lost Creek Development Company, in 5-25-95, abandoned a well at 1600'. Not considered a test of the structure.

Lox

LOCATION: T. 37 N., R. 86 W., Natrona County.

SURFACE FORMATION: Pierre shale.

STRUCTURE: Dome on Arminto anticline.

REMARKS: Gas was developed in the second Wall Creek sand by the Lox Syndicate, in 35-37-86, at 2058' to 2088'. The pressure was originally 500 pounds. The well now sprays a little oil.

Lucerne

LOCATION: T. 43 N., R. 94 W., T. 44 N., R. 94 & 95 W., in the valley of the Big Horn River. Gebo dome on the northwest part. Hot Springs County.

SURFACE FORMATION: Morrison.

STRUCTURE: Plunging anticline 13 miles long.

REMARKS: The Ohio Oil Company, NE $\frac{1}{4}$ NW $\frac{1}{4}$ of 16-44-95, was dry at 2500'. The Frontier was encountered at 2000'. See also Gebo dome which is a part of the Lucerne anticline. See U. S. G. S. Bulletin No. 656.

Lysite Mountain

LOCATION: T. 44 N., R. 90 W., south side of the Big Horn Basin, Hot Springs County.

SURFACE FORMATION: Mowry and Frontier.

STRUCTURE: Anticline four miles long cut by oblique fault. Closely associated with Lake Creek, and Black Mountain Anticline.
REMARKS: The Miners Oil & Gas Syndicate, in 23-42-90, found water in the Muddy sand at 1008'. This is a possible black oil structure. May have good chance in black oil series due to its relation to Black Mountain. Structure map in U. S. G. S. Bulletin No. 656.

McGill Anticline

LOCATION: T. 21 N., R. 75 W., 12 miles northwest of the town of Rock River, Albany County.
SURFACE FORMATION: Chugwater.
STRUCTURE: Narrow anticline trending NE and SW, having a closure three or four miles in length.
REMARKS: The possible sands are in the Forelle and Casper. The Producers & Refiners Corporation, in 10-21-75, found a water-bearing sand at 1185'. The hole was abandoned at 1225'.

Mahogany Butte

LOCATION: T. 43 N., R. 88 & 89 W., southern Big Horn Basin, Washakie County.
SURFACE FORMATION: Chugwater on the south end, Mowry on the north end.
STRUCTURE: Plunging anticline ten miles long with no closure.
REMARKS: Faults across strike may effect accumulation possibilities for both light and black oils. Structure not fully tested.

Mahoney Dome

LOCATION: T. 26 N., R. 88 W., south of Wertz dome, Carbon County.
SURFACE FORMATION: Niobrara and Steele.
STRUCTURE: Closed anticline ten miles long, partly covered. Part of the Lost Soldier anticline; cut by several faults.
REMARKS: The discovery well was drilled by the Kasoming Oil Company in 1919 in the SW corner, NE $\frac{1}{4}$, 34-26-88. Frontier at 865'. Gas sand at 1130' to 1140'. Muddy at 2160' was found to be gas bearing (30 million) total depth 2525'. During the year 1915, 10 million cubic feet of gas was developed in the Dakota in two wells, sand at 2350' is 60 feet thick. 71 million feet of gas developed in the Sundance during 1925 in six wells. The sand is encountered at 2900' and is 100' thick. The field now has 11 gas wells with an initial open flow of 194 million cubic feet. Prior to 1923 this field produced gas only; since then two tests have produced oil. In 26-26-88, the Kasoming Oil Company has a well making 7 barrels of 38 degrees gravity oil from the Dakota. See U. S. G. S. Bulletin No. 756.

Mandel

LOCATION: T. 16 N., R. 76 W., Laramie Basin, Albany County.
SURFACE FORMATION: Steele.
STRUCTURE: Small dome.
REMARKS: Tested by the Associated Oil Company in 11-16-76. The Wall Creek at 2385' was water-bearing, as was also the Muddy at 3005'. The well was abandoned at 3078'.

Manderson

LOCATION: T. 49 & 50 N., R. 91 & 92 W., east side of Big Horn Basin, Big Horn County.

SURFACE FORMATION: Mesa Verde and Cody.
STRUCTURE: Northwest plunging anticline; 12 miles long, open to the southeast.
REMARKS: A deep test drilled in 19-49-91 had a show of oil in the Kimball at 1390', and 5 million cubic feet of gas in the Muddy at 1800'. The hole was abandoned at 2065', through the Greybull which was water-bearing. C. D. Markham's well in 17-49-91, had a show of oil and gas at 1780', at which depth it was abandoned. Frontier Oil & Gas Syndicate, in the same section, had a hole full of water at 2060'. See U. S. G. S. Bulletin No. 656.

Maverick Springs

LOCATION: T. 5, 6 and 7 N., R. 1, 2, and 3 W., of Wind River Meridian. On ceded portion of the Shoshone Indian Reservation, Fremont County.
SURFACE FORMATION: Chugwater in center, Mesa Verde on flanks.
STRUCTURE: Anticline composed of three domes, as follows: Little Dome on SE $\frac{1}{4}$; Big Dome in the center and Circle Ridge Dome on the NW. Highly faulted.
REMARKS: Oil was discovered on the Maverick Springs structure in the winter of 1917-1918. Big Dome and Circle Ridge Dome are described elsewhere in this summary. Description of Little Dome will be found in the paragraph following. See U. S. G. S. Bulletin No. 711-H. A total of 24 wells have been drilled and shut in. Black oil and no pipe line or market.

Little Dome (Maverick Springs)

LOCATION: T. 5 N., R. 1 W., of Wind River Meridian.
SURFACE FORMATION: Cloverly.
STRUCTURE: Dome. Faulted on SW flank parallel to axis. The downthrow is on the northeast next to the axis.
REMARKS: One well encountered gas in the Chugwater at 1500'. Embar should be encountered at approximately 2200'. Union Oil Company of California is now testing Little Dome at a location in the NW SE NE, 15-5-1. See U. S. G. S. Bulletin No. 711-H.

McComb Dome

LOCATION: T. 39 & 40 N., R. 92 & 93 W., 16 miles north of Shoshoni, Northeastern Fremont County.
SURFACE FORMATION: Wind River.
STRUCTURE: ?
REMARKS: Minnesota-Wyoming Oil Company drilled one test at 2900' or nearly to the Lakota. Well drilled by the Carpathia Company, SE $\frac{1}{4}$, 20-39-92, known as the Copper Mountain well, found sand all the way to 2594. Must have been Tertiary.

McMaron Field

(See Big Pole Cat)

Medicine Bow

LOCATION: T. 21 N., R. 79 W., Carbon County.
SURFACE FORMATION: Mesa Verde.
STRUCTURE: Closed dome six miles long.
REMARKS: The discovery well on this structure was drilled by the Southwestern Petroleum Company in 1923, in the NW corner

of the SW $\frac{1}{4}$ of 25-21-79. The top of the Muddy sand was encountered at 4035'. The well had initial production of 975 barrels, but on deeper drilling water was encountered. The sand was cased off and the well carried on down to the Dakota, which was dry. The Muddy sand, at 4860' to 4887' and the Lakota at 4968' were water-bearing. This company also drilled three other tests on this structure, which were dry. P. & R. and Texas Company, testing last year in NW $\frac{1}{4}$, 25-21-79, got a 65-barrel well, but failed to hold up and was abandoned at 4235'.

Mellem Dome

LOCATION: T. 29 N., R. 81 W., Natrona County.
 SURFACE FORMATION: Niobrara.
 STRUCTURE: Small unfaulted dome.
 REMARKS: Map by H. M. Sherrard on shale dips in the Niobrara. Tested dry to 3080' by Ohio Oil Company in the NE corner of 13-29-82.

Mercer

LOCATION: T. 51 N., R. 90 W., east side of the Big Horn Basin, Big Horn County.
 SURFACE FORMATION: Sundance.
 STRUCTURE: Mountainward anticline.
 REMARKS: The Ohio Oil Company drilled a well in 33-51-90, which was completed through the Tensleep. All sands encountered carried water. See U. S. G. S. Bulletin No. 656.

Meridian

LOCATION: T. 22 & 23 N., R. 115 W., Southern Lincoln County.
 SURFACE FORMATION: Beckwith (Carboniferous).
 STRUCTURE: Sharp anticline; approximately 66 miles long.
 REMARKS: This structure may be considered favorable, and it has been insufficiently tested. The Spring Valley anticline is included on this structure. For list of wells drilled in southern Uinta County, see U. S. G. S. pp. 56; see U. S. G. S. pp. 143.

Midway Dome

LOCATION: T. 35 N., R. 79 W., nine miles north of Casper, Natrona County.
 SURFACE FORMATION: Fox Hills.
 STRUCTURE: Dome.
 REMARKS: The Midwest Oil Company tested this structure in 23-57-79. Shannon sand contained water at 2430'. The Wall Creeks were also water-bearing. Hole was abandoned at 4822'.

Miller Hill

LOCATION: T. 17 N., R. 89 W., southern Wyoming, Carbon County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Northeast-southwest faulted anticline; plunging to southwest, six miles long, 1000' of closure.
 REMARKS: A well drilled by Funk and others in 3-17-89 found water and a show of oil at 1064' to 1078' in the Sundance, water also in the Chugwater at 1100'. Abandoned at 1200' in the Embar. Tensleep not tested.

Monument

LOCATION: T. 53 N., R. 103 W., Park County.
 SURFACE FORMATION: Pennsylvanian to Cambrian.
 STRUCTURE: Unclosed.
 REMARKS: Reports in the following U. S. G. S. publications: Bulletin 285, pp. 120-F and 53.

Monument Hill

LOCATION: T. 56 N., R. 69 W., Campbell County.
 SURFACE FORMATION: Pierre & Fox Hills.
 STRUCTURE: Northwest-southeast trending anticline 5 miles long. Faulted along the axis.
 REMARKS: Map by D. E. Winchester, who estimates the Muddy sands at 4000' and the Dakota at 4500'. Also called Rocky Point plunging anticline Stroner Dome (See also Rocky Point plunging anticline).

Moorcroft Field

LOCATION: T. 51 & 52 N., R. 67 W., Black Hills district; northeastern Wyoming; Crook County.
 SURFACE FORMATION: Dakota.
 STRUCTURE: General attitude is monoclinial. Irregular anticline in east part.
 REMARKS: A few small wells produced oil from the Muddy. Uncommercial field.

Morris

LOCATION: 12 miles northeast of Basin, Big Horn County.
 SURFACE FORMATION: Chugwater red beds.
 STRUCTURE: Sharp mountainward fold, 18 miles long and three miles wide.
 REMARKS: Favorable structure for heavy oil production.

Morton

LOCATION: On Nowood Creek near Mahogany Butte, Hot Springs County.
 SURFACE FORMATION: Cody shale.
 STRUCTURE: Small narrow anticline.
 REMARKS: Favorable structure; untested. Frontier would be found at about 2500'.

Muddy Creek

(See Dad)

Mule Creek Field

LOCATION: T. 39 & 40 N., R. 60 & 61 W., 18 miles west of Edgemont, South Dakota; Niobrara County.
 SURFACE FORMATION: Muddy sand on western anticline; Carlile on eastern anticline and Niobrara on flank.
 STRUCTURE: Two domes called the East Dome and West Dome. They lie on the axis of the Hartville uplift; between Old Woman Creek anticline and the Black Hills.
 REMARKS: Oil was discovered in the Lakota sand on East Dome in the year 1919 by the Ohio Oil Company. Initial production of the first wells drilled, was approximately 150 barrels per day. 42 wells on the East Dome have a total production of 650 barrels per day. Very little oil has been produced from the West Dome. The oil has a gravity of 31.4 degrees and, as it is very

low in gasoline content, does not command a ready market. The field is shut in at the present. Argo now drilling deep test in NW $\frac{1}{4}$ Sec. 19-39-60, found water in Embar, and will test Tensleep.

Murphy Dome

LOCATION: T. 43 N., R. 91 & 92 W.
SURFACE FORMATION: Cody shale.
STRUCTURE: Dome with 300' of closure.
REMARKS: One well drilled by the Ohio Oil Company developed 2,500,000 cubic feet of gas in the Frontier.

Muskrat

LOCATION: T. 33 N., R. 91 W., Fremont County.
SURFACE FORMATION: Cody with overlap of Wasatch.
STRUCTURE: Dome. Part of Dutton Basin.
REMARKS: Ohio Oil Company in 8-33-91, abandoned a well at 3416', thought to have ended in the Frontier but may have Niobrara. See also Buck Springs in Fremont County. P. & R. last summer got a 75 million gas well in NW SE SE of 34-34-92 in top of Frontier at 4340'. Possibilities for oil in lower Frontier and Cloverly. P. & R. now drilling three tests.

Natrona

(See Wilson Dome)

Neiber Dome

LOCATION: T. 45 & 46 N., R. 93, 94 & 95 W., east side of Big Horn Basin, Washakie County.
SURFACE FORMATION: Fort Union.
STRUCTURE: Broad basinward anticline 15 miles long, with a small closure on the southeast end. The rest of the structure plunging gently to the northwest. It crosses the Big Horn River.
REMARKS: Midwest Refining Company, in 13-45-93, abandoned a test at 4325', which, to that depth, had encountered no sand. Structural map in U. S. G. S. Bulletin No. 656.

Newcastle

LOCATION: T. 45 N., R. 61 W., Weston County.
SURFACE FORMATION: Pierre to Morrison.
STRUCTURE: Westward dipping monocline with marked changes of strike and dip. Probably some strike faulting.
REMARKS: Several oil seeps led to the drilling of a number of wells, none of which proved to be commercial. See U. S. G. S. G. F. 107.

Newcastle-Salt Creek

LOCATION: Section 10, T. 45 N., R. 61 W., Weston County.
SURFACE FORMATION: Dakota to Sundance.
STRUCTURE: Probably none.
REMARKS: Signal Butte Oil Company in 10-45-61, found water in all sands and was abandoned at 1325'.

North Casper Creek

LOCATION: T. 36 and 37 N., R. 81 and 82 W., 21 miles northwest of Casper, Natrona County.
SURFACE FORMATION: Frontier.
STRUCTURE: Closed anticline three or four miles long; not of great magnitude.

REMARKS: In 1925, the Midwest Refining Company abandoned a well in 36-37-82, at 3308'. In this well the Embar carried a small amount of black oil of 17 degrees gravity from 3199' to 3202'. The Tensleep produced a small amount of brown oil of 22 degrees gravity and 50,000 barrels of water. The Columbus Oil Company, in 7-36-81, after encountering fresh water in the Amsden, abandoned its well at 3400'.

Notches Dome

LOCATION: T. 37 N., R. 85 W., Natrona County.
SURFACE FORMATION: Frontier.
STRUCTURE: Sharp anticline.
REMARKS: Midwest Refining Company in 10-37-65, encountered a well in the Tensleep, from 2755', good for 200 barrels daily of 22 degrees gravity oil. Marland Oil Company of Colorado drilled a well in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of 10-37-85, good for 50 barrels. Midwest completed their second producer for 175 barrels.

Nowood Anticline

LOCATION: T. 48 N., R. 89 and 90 W., Southern Big Horn County.
SURFACE FORMATION: Upper Chugwater on western closure and upper Cloverly on eastern closure.
STRUCTURE: Long narrow anticline, 8 miles long. Closed and includes two smaller closures. One small fault on the northwest end.
REMARKS: A well in 5-48-90, found a good showing of gas in the Embar at 950'. Water in the Tensleep at 1060'. A show of oil in the Amsden at 1425'. Abandoned in the Madison lime at 1670'. Commercial gas field might possibly be developed. Structure map in U. S. G. S. Bulletin No. 656. Carter Oil Company last year completed a dry hole at 1866' in SW 5-48-90, all sands being water bearing.

O'Brien Springs

LOCATION: T. 24 N., R. 87 W., south of Mahoney and Ferris Field, Carbon County.
SURFACE FORMATION: Mesa Verde and Steele.
STRUCTURE: Faulted anticline; pitching gently to the east.
REMARKS: The Ohio Oil Company, in 2-47-87, developed 1,000,000 cubic feet of gas in the Frontier at 3620'. The Muddy sand at 4242' was water-bearing and the Dakota at 4365' was dry. The well was abandoned at 4425'.

Oil Mountain

LOCATION: T. 32 and 33 N., R. 82 W., 20 miles southwest of Casper, Natrona County.
SURFACE FORMATION: Lower Cretaceous Conglomerate.
STRUCTURE: Anticline with crest cut by a large strike fault.
REMARKS: Three wells were drilled in 1918, one having a strong flow of gas and the other two having good shows of oil, probably from the Tensleep. The Embar at 3200' carried water. The structure is believed to have possibilities.

Oil Springs

LOCATION: T. 23 N., R. 79 W., Carbon County.
SURFACE FORMATION: Frontier.
STRUCTURE: Narrow faulted anticline.

REMARKS: The Ohio Oil Company, in 2-23-79, found water in the Muddy sand at 1400'. The test was possibly off structure.

Old Woman Creek (Cow Gulch)

LOCATION: T. 36 N., R. 62 W., on axis of Hartville uplift, Niobrara County.

SURFACE FORMATION: Dakota.

STRUCTURE: North south trending anticline. Fault parallel to the axis on the west side.

REMARKS: A little black oil was encountered in the Minnelusa (Pennsylvanian) at 1416', but not in commercial quantities in wells drilled in 9-36-62 by Norbeck and Nicholson. Continental drilling in NW¼ of 30-36N-62W, got a dry hole.

Oregon Basin

LOCATION: T. 50 and 51 N., R. 100 W., west side of Big Horn Basin, Park County.

SURFACE FORMATION: Upper Frontier surrounded by Torchlight sand.

STRUCTURE: Two domes called North dome and South dome, cut by several faults, one of which has a vertical displacement of 1200' and a horizontal displacement of 3000'.

REMARKS: Rated as an important black oil and gas field. Considerable gas and traces of oil were found as far back as 1916. A number of gas wells have been completed. Gas supply for the town of Cody. Horizons in which shows of commercial production of oil or gas are found: (1) Frontier; (2) Sandy Zone near center and base of Thermopolis; (3) Cloverly; and (4) sand near top of Morrison. The Cloverly is the main producing horizon but numbers 2 and 3 are of importance. 105,000,000 cubic feet of gas has been developed in 3 wells. See Bulletin Wyoming State Geologist No. 15, and U. S. G. S. Bulletin No. 656. During past two years, 19 black oil wells have been completed in the Embar with an average initial production per well of 500 barrels.

Osage Field

LOCATION: T. 46 N., R. 63 and 64 W., Weston County.

SURFACE FORMATION: Graneros shale.

STRUCTURE: In the form of two terraces. Drilling depth is from 100' to 300' on one terrace, and from 1300' to 1600' on the other.

REMARKS: 90 wells have combined daily production of 375 barrels of oil of 31.6 degrees gravity. Production is found in the Newcastle (Muddy) sand. The Dakota carried water. Several gas wells which gauge from half million to million and half cubic feet have been completed.

Pacific Creek

LOCATION: T. 27 and 28 N., R. 101 and 102 W., Sweetwater County.

SURFACE FORMATION: Wasatch.

STRUCTURE: Northwest southeast trending anticline.

REMARKS: Untested. The merits of this structure are questionable, due to the stratigraphy.

Paint Rock Anticline

LOCATION: T. 49 and 50 N., R. 90 and 91 W., Big Horn County.

SURFACE FORMATION: Sundance.

STRUCTURE: Closed anticline 12 miles long with 1200' of closure. REMARKS: Tested with three dry holes, one of which penetrated the Tensleep.

Palmer Dome (See Place Dome)

Peay Hill (See Greybull Field)

Picket Lake

LOCATION: T. 26 N., R. 97 W., Sweetwater County.

SURFACE FORMATION: Adaville.

STRUCTURE: Anticline, probably unclosed.

REMARKS: Associated Oil Company, in its test in 22-27-97, abandoned a well at 3100'.

Picnic Grounds

LOCATION: T. 22 N., R. 86 W., Carbon County.

SURFACE FORMATION: Mowry.

STRUCTURE: Part of the Grenville anticline.

REMARKS: Ed Goode, in 36-22-86, had a good showing of oil from three feet of sand at 1906'. Reported to have filled up 300'. Well was abandoned at 4110'.

Pilot Butte

LOCATION: T. 3 N., R. 1 W., of the Wind River Meridian. Fremont County.

SURFACE FORMATION: Pierre.

STRUCTURE: Dome four miles long and two miles wide, lying on both sides of Wind River. Field is faulted.

REMARKS: The Pilot Butte field was discovered in 1916; the producing sand is in the base of the Pierre about 2000' above the Wall Creek. The field is on the Shoshone Indian Reservation, and land is leased directly from the Indians through the agent at Fort Washakie. 28 wells, producing from an average of 1000', make 350 barrels of oil per day. The gravity of the oil is 37.2 degrees. A three-inch pipe line 20 miles long and belonging to the Illinois Pipe Line, delivers Pilot Butte oil to a loading rack at Riverton, where it is shipped by rail to the Midwest Refining Company's plant at Casper. The field is controlled by the Argo Oil Company. Kinney-Coastal drilling deep test in SW SE SW of 22-3N-1W, now 1000' deep. Expect Sundance between 4100' and 4500'. They had a 25-barrel producer in the upper Muddy at 3368' and developed 64 million gas at 3370'; drilling deeper.

Pine Dome

(See Pine Mountain Dome).

Pine Mountain Dome

LOCATION: T. 34 and 35 N., R. 83 and 84 W., Natrona County.

SURFACE FORMATION: Morrison.

STRUCTURE: Large faulted dome, on general anticline between Laramie Mts. and the Big Horn Mt. Iron Mountain, Goose Egg and three smaller structures are on this same anticline.

REMARKS: The Tensleep and Embar produce considerable gas. A black oil, remarkably high in lubricating qualities, is also found in the Tensleep. The Alaska Development Company found light oil at 2824', probably in the Madison. This is the first occur-

rence of light oil in Wyoming in formation lower than the Cloverly. Clyde Brannon et al., drilled two gas wells in the summer of 1926 in 26-35-84.

Pitchfork

LOCATION: T. 48 N., R. 102 W., west side of the Big Horn Basin, Park County.

SURFACE FORMATION: Mowry.

STRUCTURE: Anticline $3\frac{1}{2}$ miles long which apparently pitches at both ends. The data on this structure is very meager.

REMARKS: Untested. Possible productive sands would be Muddy and Greybull. Structure is located 55 miles from the nearest railroad. California Exploration Company and P. & R. drilling at 2275 in Southwest corner of NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 14-48-102.

Place Dome

(Part of Emigrant Gap Anticline)

LOCATION: T. 34 N., R. 82 W., Natrona County.

SURFACE FORMATION: Mowry.

STRUCTURE: Dome with 700' of closure.

REMARKS: Bradford-Wyoming Oil Company completed a well in 9-34-82 to the Madison lime at 3358' to 3367', which was dry.

Plunkett Field

LOCATION: T. 1 S., R. 1 E. of the Wind River Meridian, Fremont County.

SURFACE FORMATION: Mowry.

STRUCTURE: Fault blocks on Shoshone anticline with displacements as high as 500'.

REMARKS: Produced a small amount of high grade oil for several years, but is now abandoning. See Bulletin Wyoming State Geologist No. 2, Series B.

Poison Spider

LOCATION: T. 33 N., R. 84 W., 24 miles west of Casper, Natrona County.

SURFACE FORMATION: Cody shale.

STRUCTURE: Dome.

REMARKS: Until 1922 this field was a producer of gas only. Several gas wells having capacities as high as 40,000,000 cubic feet, were completed. In July, 1922, the New York Oil Company completed a 250-barrel well in the Tensleep sand at 3366'. Fargo-Western Oil Company has 19 wells completed on this structure, producing 750 barrels per day of 17 degrees gravity oil from the Sundance at approximately 2350'. Poison Spider ranks second in importance among Wyoming black oil fields.

Pole Cat

(See Big Pole Cat).

Powder River

(See Tisdale Dome).

Powder River Station

LOCATION: T. 36 N., R. 85 W., a few miles southwest of Powder River Station, Natrona County.

SURFACE FORMATION: Frontier.

STRUCTURE: Dome 16 miles long and 10 miles wide. 150' to 200' of closure.

REMARKS: A number of small gas wells have been completed on this structure, in years past, in the First Wall Creek sand. Midwest Refining Company, in 25-36-85, found 1,000,000 cubic feet of gas in the first Wall Creek sand at 1132' to 1215'. An excellent showing of shale oil at 1375', a small amount of gas in the second Wall Creek at 1485' to 1560', water in the third Wall Creek sand at 1626' to 1745', show of oil in the fourth Wall Creek sand at 2075', and estimated 15 barrels of oil in a sandy shale in the bottom of the fourth Wall Creek, water in the Lakota at 2480' to 2500'. It is believed that commercial production might be developed in the fourth Wall Creek sand, and the Midwest Refining Company has announced its intention of drilling another well on the structure.

Pump Creek

LOCATION: T. 47 and 48 N., R. 64 W., Weston County.

SURFACE FORMATION: Dakota.

STRUCTURE: Anticline five miles long with 125' of closure.

REMARKS: Structure being tested by L. B. Lilly in the NW corner 35-48-64.

Puddle Springs

LOCATION: T. 33 N., R. 91 W., Dutton Basin, Fremont County.

SURFACE FORMATION: Called Niobrara, probably Cody.

STRUCTURE: Apparently closed dome. Small closure.

REMARKS: In 24-33-91, water was found in 73' of first Frontier at 1720' to 1815', the second Frontier was dry at 1960', 40' of third Frontier was dry at 2135' and 18' of fourth Frontier was dry at 2272'. The hole was abandoned at 2320'.

Quealy

LOCATION: T. 17 N., R. 76 and 77 W., Albany County.

SURFACE FORMATION: Steele shale.

STRUCTURE: Narrow anticline.

REMARKS: Tested by Matador Petroleum Company (Roxana Petroleum Company); show of oil in the Mowry at 3400'. Water in the Muddy and Dakota. Total depth 3600'. Log of well and location of same not available. The Texas Production Company, testing in 13-17-77, abandoned at 3574', and in the SE of 8-17-77, abandoned at 2857'.

Rattlesnake

LOCATION: Western Natrona County—forms Rattlesnake Mountain.

SURFACE FORMATION: Chugwater; granite core exposed.

STRUCTURE: Monocline.

REMARKS: Tested in 1900. Complete reports from U. S. G. S. Bulletin 641 and Bulletins of the Wyoming State Geologist No. 5 and No. 12.

Rawlins

LOCATION: Three miles west of Rawlins, Carbon County.

SURFACE FORMATION: Steele.

STRUCTURE: Broad faulted anticline.

REMARKS: Untested. Ed Goode, et al., have a rig up in the SW of NE of 24-21-88.

Rawhide Butte

LOCATION: Northern part of Goshen County.
 SURFACE FORMATION: Tertiary.
 STRUCTURE: Slight doming in Tertiary.
 REMARKS: Foreman Oil Company, in 24-26-62, is temporarily suspended at 1200'.

Red Desert

LOCATION: T. 23 N., R. 96 W., Sweetwater County.
 SURFACE FORMATION: Wasatch.
 STRUCTURE: Broad anticline, closure doubtful.
 REMARKS: Red Desert Oil Company, in 10-26-97, abandoned a test at 3100'.

Red Fork

LOCATION: T. 45 N., R. 84 W., Johnson County.
 SURFACE FORMATION: Morrison.
 STRUCTURE: Anticline.
 REMARKS: Untested. Not considered very favorable.

Red Springs Anticline

LOCATION: T. 43 N., R. 93 W., south side of Big Horn Basin, Hot Springs County.
 SURFACE FORMATION: Embar.
 STRUCTURE: Closed anticline.
 REMARKS: Small amount of black oil found in the Amsden, in one well. Closely associated with Blue Springs Anticline. Structural maps are contained in U. S. G. S. Bulletins No. 656 and No. 711.

Rex Lake

LOCATION: T. 16 N., R. 77 W., Laramie Basin, Albany County.
 SURFACE FORMATION: Steele.
 STRUCTURE: Small closed dome. Producing oil from the Muddy and Cloverly.
 REMARKS: Discovered in October, 1923. Rated as an important light oil field. The Ohio Oil Company owns all acreage on this structure, and has completed four wells, approximately 4000' deep, which are capable of producing about 750 barrels per day. The oil from the Rex Lake Field has an average gravity of 35 degrees, is low in gasoline content, and does not command a very ready market. The field is connected by a short pipe line to loading racks at the town of Fillmore.

Rock River

LOCATION: T. 19 and 20 N., R. 78 W., Carbon County.
 SURFACE FORMATION: Pierre shale.
 STRUCTURE: Closed anticline, three miles long north and south by a mile wide. Faulted along western flank.
 REMARKS: Two Muddy sands contain oil. The Dakota is the important oil bearing formation occurring at 2725' and 2775'. Rock River is the fourth largest field in Wyoming. It produces light oil of 35.3 degrees gravity. 61 wells completed have a combined capacity of 3000 barrels of oil per day. The field is controlled by the Ohio Oil Company. The Wyoming State Geologist placed the amount of removable oil from Rock River at 23,600,000. See U. S. G. S. Bulletin No. 364.

Rock Creek-Needles Anticline

LOCATION: T. 14 N., R. 120 W., to T. 22 N., R. 117 W.
 SURFACE FORMATION: Beckwith and Evanston.
 STRUCTURE: Narrow anticline.
 REMARKS: Untested.

Rocky Ford

LOCATION: T. 52 N., R. 61 W., Crook County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Anticline.
 REMARKS: One well had a show of heavy oil in the Minnelusa.

Rocky Point Anticline

LOCATION: T. 56 and 56½ N., R. 68 and 69 W., Crook County.
 SURFACE FORMATION: Pierre.
 STRUCTURE: Northwest plunging structural anticline from the Black Hills uplift, separated into three structures, called North Dome, Stroener Dome and Monument Hill structure.
 REMARKS: Untested.

Rozet

(Also called Cottonwood Dome)

LOCATION: T. 50 N., R. 69 W., near town of Rozet, Campbell County.
 SURFACE FORMATION: White River.
 STRUCTURE: Slight doming in the Tertiary.
 REMARKS: Rozet Oil Company, testing in 31-50-69, abandoned at 2100', not having encountered any known sands.

Sage Creek

LOCATION: Two miles south of Frannie, Big Horn County.
 SURFACE FORMATION: Cody shale.
 STRUCTURE: Sharp anticline.
 REMARKS: The Ohio Oil Company found the Greybull dry at 1100', and abandoned the well at 1800'.

Sage Creek

LOCATION: Part of Shoshone Anticline, Fremont County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Dome on north end of Shoshone anticline.
 REMARKS: Wells drilled by the Ohio Oil Company in 1917, found oil in the lower Chugwater and in the Embar, but not in commercial quantities. The Bridger Oil Company is testing in 21-1-1, and was in the top of the Amsden at 1370'. The Tensleep at 1250' was water-bearing. The well was abandoned at 1958' in the Amsden.

Sand Draw

(See Big Sand Draw, Fremont County).

Sand Draw

LOCATION: On the north flank of the Thermopolis anticline, 16 miles northwest of Thermopolis, Hot Springs County.
 SURFACE FORMATION: Upper Cody shale.
 STRUCTURE: Plunging anticline with slight doming at one end.

REMARKS: Frontier sand should be encountered at about 2000' and the Greybull at about 3000'. Structure map in U. S. G. S. Bulletin No. 656.

Saratoga

LOCATION: T. 17 and 18 N., R. 84 and 85 W., Carbon County.
 SURFACE FORMATION: Steele and Mesa Verde.
 STRUCTURE: Northwest southeast trending anticline, 9 miles long with approximately 2000' of closure.
 REMARKS: Southwestern Petroleum Company drilled a dry hole with show of oil and gas to a total depth of 4400'.

Salt Creek Field

LOCATION: T. 40 and 41 N., R. 79 W., Natrona County.
 SURFACE FORMATION: Steele and Mesa Verde.
 STRUCTURE: The outermost wave from the Big Horn Mountain Uplift. Closed anticline 30 miles long, cut by numerous faults which probably occurred subsequent to the major folding. They trend north 80 degrees east.
 REMARKS: The first producing well in this field was drilled in 1899 on the SE $\frac{1}{4}$ of 34-41-79. The production was from 4 to 8 barrels per day of heavy oil from the Shannon sand. The first flowing well was completed October 23rd, 1908, and was located on the SE $\frac{1}{4}$ of 23-40-79. The top of the sand was encountered at 1052', and the base of the sand occurs in the Steele shale and produces some oil at shallow depths four miles north of the main Salt Creek field. The principal producing sands are the Wall Creeks, which belong to the Frontier formation. The first Wall Creek produces from depths ranging from 1100' to 1400', and the second Wall Creek produces from depths ranging from 1490' to 2740'. A third Wall Creek sand has been picked up in the south part of the field in the saddle between Salt Creek and Teapot Dome. In the early part of 1925, the Midwest Refining Company encountered the Lakota sand on the NW of 35-40-79, at from 2278' to 2308'. The initial production of this well was 3489 barrels. In the early part of October, 1925, the Midwest Refining Co., drilling on the NW of 23-40-79, encountered a sand in the Sundance at from 2896' to 2965'. A total of 104 wells have been completed to the deeper sands, and about 10,000 barrels are being taken daily from this horizon. The potential production of the present deep sand wells is estimated at 8,000 barrels. Several of the Lakota producers have been carried to the third bench of the Sundance for good producers. The Salt Creek field is the largest field in Wyoming, and produces a light oil of an average gravity of 38.2 degrees. There are 22,500 acres of proven area.

Schaad Dome

(See McComb Dome).

Schnoor Dome

(Bates Hole District)

LOCATION: T. 31 N., R. 80 W., Natrona County.
 SURFACE FORMATION: Wall Creek sand.
 STRUCTURE: Dome with 100 feet of closure.
 REMARKS: Kinney-Coastal Oil Company test in NE corner of 31-31-80, found water in the Tensleep at 2935', other sands dry. Abandoned at 2942'. The test was well located on the structure.

Separation Flats

LOCATION: T. 24 N., R. 88 W., Carbon County.
 SURFACE FORMATION: Niobrara.
 STRUCTURE: Doubtful. Part of Belle Springs structure.
 REMARKS: M. M. Armstrong abandoned a test in 35-25-88, at 2900'. New York Oil Company encountered a little gas at 2300' in 31-24-88. Perlberg well in 30-24-88, had a hole full of water in sand from 2130' to 2220'.

Shannon

(Part of Salt Creek)

LOCATION: Section 36-41-79, Johnson County.
 SURFACE FORMATION: Pierre.
 STRUCTURE: Part of Salt Creek anticline.
 REMARKS: First development in Salt Creek field. Small amount of heavy paraffin oil, free of gasoline, in the Shannon sand at 700' to 1100'. Field now practically abandoned.

Sheep Creek

LOCATION: T. 28 N., R. 92 W., Fremont County.
 SURFACE FORMATION: Sundance.
 STRUCTURE: Faulted dome.
 REMARKS: Union Oil Company of California, in SE $\frac{1}{4}$ of 10-28-92, abandoned at 2860'. American Oil Workers Company had a dry hole at 3490' in NW 14-28-92, and P. & R., a dry hole in SW of 18-28-92.

Sheep Mountain

LOCATION: Northeastern Big Horn Basin, Big Horn County., T. 55-56 N., R. 95 W.
 SURFACE FORMATION: Madison.
 STRUCTURE: Anticline 15 miles long, which forms Sheep Mountain.
 REMARKS: Stratigraphically unfavorable for oil. See U. S. G. S. Bulletin No. 656. Tested for black oil. Showing in the Embar. Prairie Oil & Gas, in SW of SW 35-56-95, reached top of Deadwood formation at 2250', and abandoned at 3035', being 53' in the granite.

Shell Creek and Cherry Anticline

LOCATION: T. 52 and 53 N., R. 92 W., 8 miles northeast of Greybull, Big Horn County.
 SURFACE FORMATION: Greybull and Morrison on Shell Creek. Sundance on Cherry.
 STRUCTURE: Anticline plunging to northwest with two small closures. The Cherry anticline and the Shell Creek dome. No faulting.
 REMARKS: Shell Creek was tested unfavorably through the Amsden. A test on Cherry Creek was completed in the Chugwater and did not test the Embar. Drilled in 1915.

Shepard Dome

LOCATION: T. 57 N., R. 61 W.
 SURFACE FORMATION: Mowry.
 STRUCTURE: Small anticline.
 REMARKS: Tested dry.

Shoshone

LOCATION: T. 53 N., R. 101 W., Park County.
 SURFACE FORMATION: Frontier.
 STRUCTURE: Anticline five miles long.
 REMARKS: Small wells have developed in the Muddy sand at 850' and 1050'. Uncommercial pool. A deep test drilled on the NE $\frac{1}{4}$ of 20-53-101 by the Washington Oil & Gas Company, was abandoned at 2300'.

Shoshone Anticline

(See Lander Oil Field).

Simpson Ridge

LOCATION: T. 21 N., R. 80 W., Carbon County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Faulted northwest southeast anticline four miles long.
 REMARKS: The producing sand is in the bottom of the Mesa Verde. Producers & Refiners Corporation have seven wells on the northwest quarter of Section 20-21-80, producing 50 barrels of oil per day. A deep test was drilled on this quarter section to a total depth of 6,941'. Two Wall Creek sands were found, both of which were dry. The first was from 5220' to 5250', and the second from 5305' to 5413'.

Sherrard Dome

LOCATION: T. 47 N., R. 89 W., Big Horn Basin, Washakie County.
 SURFACE FORMATION: Upper Frontier.
 STRUCTURE: Small dome with several faults.
 REMARKS: Oil seep in area known for many years, first drilling in 1914. Shows of oil found in six out of seven wells drilled at depths from 24 to 100'. Best well would yield seven to eight barrels. Producing horizon is probably Frontier. Not a commercial field. See U. S. G. S. Bulletin No. 656. Unfavorable for deep test.

Shirley Anticline

LOCATION: T. 25 & 26 N., R. 80 W., Carbon County.
 SURFACE FORMATION: ?
 STRUCTURE: Northwest-southeast trending anticline; open to the southeast.
 REMARKS: Tested in 1922 by H. P. Hynde. Total depth 1910'. Wall Creek sand, 700' to 800', dry. Muddy, Dakota and Lakota carried water.

Spring Creek

(See Crooks Gap)

Spring Creek

LOCATION: T. 49 N., R. 101 & 102 W., and T. 48 N., R. 100 & 101 W.
 SURFACE FORMATION: Mowry.
 STRUCTURE: Plunging anticline open to the northwest. Unfaulted.
 REMARKS: Drilled in 1915 by the Peerless Oil Company, in 4-48-101. The well was abandoned at 2310'. Omar Oil & Gas Company have a test shut down at 3015' on the NE $\frac{1}{4}$ of 11-49-102. See U. S. G. S. Bulletin No. 656.

Spring Valley

LOCATION: T. 13 N., R. 118 W., to T. 19 N., R. 115 W., Uinta and Lincoln Counties.
 SURFACE FORMATION: Beckwith.
 STRUCTURE: Anticline.
 REMARKS: Oil is found in the Aspen shales. Several wells producing, making very small amount of high gravity oil which is shipped by rail to the Utah Oil Refining Company at Salt Lake City. See Meridian in U. S. G. S., pp. 56, which calls this fold the south portion of the Meridian anticline. The field is located in the Darby fault zone.

Sodergreen

LOCATION: T. 14 N., R. 76 W., Albany County.
 SURFACE FORMATION: ?
 STRUCTURE: Small narrow northeast-southwest trending anticline.
 REMARKS: Producers & Refiners Corporation tested with a dry hole on the NE $\frac{1}{4}$ of 28-14-76.

Skull Creek

LOCATION: T. 44 N., R. 62 W., Weston County.
 SURFACE FORMATION: Thermopolis.
 STRUCTURE: Small dome.
 REMARKS: Tested by Midwest Refining Company, in 14-44-62, through the Lakota in which water was encountered. Abandoned at 3693'.

Spence Dome

LOCATION: T. 54, R. 95 W., Big Horn County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Narrow anticline.
 REMARKS: Small wells completed in the Embar at 500', not producing.

South Casper Creek

(See Poison Spider)

Strom

(See Lake Hattie)

Stroner Dome

(See Rocky Point and Monument Hill)

Sunshine and South Sunshine Anticline

LOCATION: T. 46, 47 & 48 N., R. 101 W., Park County.
 SURFACE FORMATION: Mowry on Sunshine, and Torchlight on South Sunshine.
 STRUCTURE: Elongated anticline, closed and unfaulted.
 REMARKS: Has possibility of production in Thermopolis, Cloverly, Morrison and Pennsylvanian series. See U. S. G. S. Bulletin No. 656. Union Oil Company recently completed test in NW $\frac{1}{4}$ of 22-47N-101, in which top of Embar was 3232', Tensleep at 3486', and three sands between 3486' and 3712', made 37 barrels daily on swab, and a second test in southwest corner of 9-46-101, which made 1000 barrels in 67 hours from the Embar, 2482'-2514'.

St. Mary's Anticline

LOCATION: T. 21 & 22 N., R. 84 W., Carbon County.
 SURFACE FORMATION: Mesa Verde.
 STRUCTURE: Strongly crushed, folded and faulted anticline. Mesa Verde beds are overthrust on the younger Lewis and Medicine Bow formations.
 REMARKS: Producers & Refiners Corporation testing in the NE $\frac{1}{4}$ of 9-21-84, found water in all sands, and abandoned at 700'.

Teapot Dome

LOCATION: T. 39 N., R. 78 W., Natrona County.
 SURFACE FORMATION: Shannon.
 STRUCTURE: Faulted dome on Salt Creek anticline, containing 900 acres.
 REMARKS: 62 wells, completed through the second Wall Creek sand; oil of 37 degrees gravity. Entire field known as Naval Reserve No. 3, leased by the United States to Mammoth Oil Company. Wells shut in or plugged December 31, 1927.

Tensleep Anticline

LOCATION: T. 46 N., R. 88 & 89 W., Washakie County.
 SURFACE FORMATION: Frontier.
 STRUCTURE: Faulted closed anticline.
 REMARKS: Untested structure. Holds possibilities of production in the Muddy and Greybull sands at shallow depths. A well or validation hole has been drilled on this structure in the NW $\frac{1}{4}$ of 24-46-89, which did not reach the red beds. See U. S. G. S. Bulletin No. 656. P. & R. drilled to 3420', a dry hole, in NW $\frac{1}{4}$ of 13-46-89.

Thermopolis Anticline

LOCATION: T. 43 N., R. 93, 94, 95 & 96 W., Hot Springs County.
 SURFACE FORMATION: Embar and Chugwater.
 STRUCTURE: Anticline.
 REMARKS: Stratigraphically unfavorable for oil and gas production. A well on the NW $\frac{1}{4}$ of 32-43-94, was dry in the Embar. See U. S. G. S. Bulletin No. 656.

Tisdale

LOCATION: T. 41 N., R. 81 W., Johnson County.
 SURFACE FORMATION: Lakota.
 STRUCTURE: Large dome.
 REMARKS: Water in Shilch wells, which is piped to Salt Creek for field operations. U. S. G. S. Bulletin No. 471.

Torchlight Field

LOCATION: T. 51 N., R. 92 & 93 W., Big Horn County.
 SURFACE FORMATION: Torchlight forms escarpment around the field.
 STRUCTURE: Dome three miles long with 300' of closure.
 REMARKS: This field was first drilled in 1905, being the second field in the Big Horn Basin to be tested. At the height of its production in 1915 this field had 50 wells with a production of 1500 barrels per day. The field still holds possibilities of black oil production at approximately 3500', which have never been

prospected. The oil is of a high grade paraffin base from the Kimball and OchLouie sands of the Mowry at 400'-600'. P. & R. will drill deep test next summer. See U. S. G. S. Bulletins Nos. 621 and 656.

Troublesome Anticline

LOCATION: T. 24 N., R. 81 W., Carbon County.
 SURFACE FORMATION: ?
 STRUCTURE: North and south anticline open to the north.
 REMARKS: Untested and unfavorable.

Two Bar Dome

LOCATION: T. 31 N., R. 81 W., Natrona County.
 SURFACE FORMATION: Wall Creek sand.
 STRUCTURE: Dome with 200' of closure. Basinward structure.
 REMARKS: Part of the Bates Hole structure. Untested.

Two Rivers

LOCATION: T. 17 & 18 N., R. 74 W., Albany County.
 SURFACE FORMATION: Steele.
 STRUCTURE: North-south trending anticline.
 REMARKS: The Ohio Oil Company abandoned a test on 23-18-74, through the Dakota. Wall Creek sands were encountered at 1215-65'. Muddy, 1940' to 1980'. Dakota, 2090' to 2107'. All sands were water-bearing.

Upton-Thornton Field

LOCATION: T. 47, 48 & 49 N., R. 65 & 66 W., Weston County.
 SURFACE FORMATION: Lower Graneros on Thornton and Mowry on Upton Dome. A small producing area northwest of the north dome has Niobrara and Carlile on the surface.
 STRUCTURE: Two domes and a small terraced structure.
 REMARKS: A very small amount of oil is produced from depths from 448' to 843', from a sand just above the Green Horn limestone, which occurs in the Graneros formation. The Newcastle sand outcrops and contains many seepages. Producers & Refiners Corporation, in 8-48-65, reached the Deadwood lime with a dry hole, at 2505'. Upton-Thornton is one instance of a dry anticline. While the Producers & Refiners well on the crest of the fold is dry, several wells off structure a short distance northwest are producers. Structural map in U. S. G. S. Bulletin No. 716-B. Gose Oil Syndicate, in NE corner of 28-47-65, is shut down, while Wyoming Drilling Co., in NE corner of 15-44-64, reported 160' of Wall Creek sand topped at 4190'.

Wagonhound

LOCATION: T. 44 & 45 N., R. 99 W., Hot Springs County.
 SURFACE FORMATION: Cody shale.
 STRUCTURE: Unfaulted anticline with 400' of closure plunging to the northwest.
 REMARKS: Tested by three wells. No. 1 to 1833'; No. 2 to 1300'; and No. 3 to 680'. No. 2 had a show of oil at 475'. None were productive and No. 1 tested the Frontier.

Wallace Creek

LOCATION: T. 34 N., R. 87 W., Natrona County.
 SURFACE FORMATION: Fort Union.
 STRUCTURE: Anticline which may close. Badly covered.
 REMARKS: Possible productive sand in the Teapot at 3800'. Continental Oil Company, in 15-34-97, abandoned at 4130', the Teapot sand, 3908'-3948' being flowing water.

Wamsutter Arch

LOCATION: T. 19 N., R. 95 to 99 W., Sweetwater County.
 SURFACE FORMATION: Wasatch.
 STRUCTURE: Low east and west anticlinal arch.
 REMARKS: No development. See U. S. G. S. Bulletin No. 702.

Warm Springs Field

LOCATION: T. 43 N., R. 93 & 94 W., Hot Springs County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Three domes, known as East Dome, West Dome and Condit's Dome, the latter being west of West Dome. All located on Thermopolis anticline.
 REMARKS: First commercial oil well in Warm Springs Field was drilled in 1917. The East and West Domes are oil bearing. The oil is found in the Embar sand; it is heavy black oil and no market.

Waterfall

LOCATION: T. 15 N., R. 115 W., Uinta County.
 SURFACE FORMATION: Beckwith.
 STRUCTURE: Part of Meridian anticline.
 REMARKS: A little oil was encountered in the Beckwith at 1300', in 11-15-115.

Waugh Anticline

(See Ilo Ridge)

Wertz Dome

LOCATION: NW corner of T. 26 N., R. 89 W., Carbon County.
 SURFACE FORMATION: Steele.
 STRUCTURE: Alluvium covered dome on Lost Soldier anticline.
 REMARKS: The Producers & Refiners Corporation had well that produced for three years an average of 25 barrels of oil per day from 3210', and 20,000,000 cubic feet of gas from 3400' to 3425'. The well no longer produces oil, but is still making 20,000,000 cubic feet of gas with a rock pressure of 920 lbs., makes 140 gallons of gasoline per day from the drips. This same company has recently completed 4 other wells on the structure, good for 30,000,000 each, and now drilling on 2 wells.

West Foote Creek

LOCATION: T. 22 N., R. 78 W., Carbon County.
 SURFACE FORMATION: Dakota.
 STRUCTURE: Northeast-southwest trending, sharply folded anticline two miles long.
 REMARKS: Prairie Oil & Gas Company's test in 25-22-78, found the Embar missing and encountered water in the Tensleep at 2140'. Hole abandoned.

Wilson Dome

LOCATION: T. 37 & 38 N., R. 83 W., Natrona County.
 SURFACE FORMATION: Basal Niobrara.
 STRUCTURE: Highly faulted dome.
 REMARKS: The Ohio Oil Company drilled a hole through the Dakota in the SE corner of the NW $\frac{1}{4}$ of Section 5-37-83, to total depth of 1615'. This well was drilled in a fault block. Marland Oil Company of Colorado, in the SE corner of the SW $\frac{1}{4}$ of 32-38-83, abandoned at 1715'. An excellent show of oil has been obtained at that depth, and 10" casing was run and cemented to case off the flow of water encountered in the Dakota series.

West Salt Creek

LOCATION: T. 40 N., R. 80 W., Natrona County.
 SURFACE FORMATION: Niobrara.
 STRUCTURE: Pie-shaped fault block.
 REMARKS: Marland Oil Company of Colorado drilled a dry hole in 11-40-80, through the Lakota. The total depth of the well was 3017'. The first Wall Creek was encountered at 1496', where the hole filled up with water. The second Wall Creek sand was encountered at 1882', and carried no water, but an excellent showing of oil, the third Wall Creek was encountered at 2105', where the hole filled up 200' of water. The Dakota and Lakota were water-bearing at 2880' and 2955' respectively.

Wild Horse Butte Dome

LOCATION: T. 42 N., R. 93 W., Hot Springs County.
 SURFACE FORMATION: Chugwater.
 STRUCTURE: Anticline three miles long plunging northwest.
 REMARKS: Unfavorable for oil and gas production. See U. S. G. S. Bulletin No. 656.

Zeisman

LOCATION: T. 49 N., R. 89 W., Big Horn County.
 SURFACE FORMATION: Tensleep and Embar.
 STRUCTURE: Dome, faulted on southwest.
 REMARKS: Stratigraphically unfavorable for oil or gas production. Untested. See U. S. G. S. Bulletin No. 656. Remote possibilities in Amsden and Madison.

Zimmerman Butte

LOCATION: T. 43 & 44 N., R. 92 & 93 W., Hot Springs County.
 SURFACE FORMATION: Cody, Mesa Verde on flanks.
 STRUCTURE: Small anticline. No faults mapped.
 REMARKS: Untested. See U. S. G. S. Bulletin No. 656. McPherson et al., drilled to 2715', a dry hole in NE of 28-44N-93W.

CHAPTER XII

Pipe Lines, Natural Gasoline Plants, Carbon Black Plants and Refineries.**Pipe Lines**

The development of the pipe line industry to transport oil and gas from one point to another, dates back to the early history of the oil business in the hills of Pennsylvania. Today there are some 97,000 miles of oil pipe lines carrying oil from the various fields, some across the continent to refining points. These oil pipe lines represent an investment of \$950,000,000. The natural gas lines carrying natural gas from the fields to cities and distribution points have some 55,000 miles of lines with a total investment of over a billion dollars.

Most oil pipe lines are powered with stations at various intervals where pumping machinery pushes the oil through the long miles of pipe to the next station until its destination in the great storage tanks is reached. The State of Wyoming, however, contains the longest oil line in the world not powered with mechanical means of forcing the oil through the pipe; this is the Grass Creek to Greybull pipe line of the Illinois Pipe Line Co., and this line is 85 miles in length and is a gravity line for the entire distance. The oil placed in this line in the Grass Creek Field flows by gravity alone to Chatham on the Big Horn River and thence to Greybull to the tank farm of the Standard Oil Company's refinery located there.

The first line was laid in the State of Wyoming between the Dallas Field and the Northwestern Railroad, at what is now termed Wyopo. This line is still carrying oil from this field and the newer Derby Dome development, to the rail point. This line was laid in 1907 and is about 12 miles in length.

Since the laying of the first pipe line near Lander some seventy pipe lines for the transportation of oil, gas and gasoline have been laid in the State of Wyoming. One gas line carries gas from Wyoming to another state. One gas line brings gas from another state to a Wyoming city, and one oil line carries oil from the fields of Wyoming to delivery on the transcontinental trunk lines that transport the oil to the Atlantic seaboard and intermediate points.

Under the present administration of the State of Wyoming, the central towns and cities of the Big Horn Basin

were assured a continuous and ample natural supply of natural gas by the Midwest Refining Co. and the Big Horn Gas Co. completing the line to the Buffalo Basin Field. The long hoped for oil line from the LaBarge Field that would enable the oil operators of that field to market their oil was also completed and is now carrying oil across the plains to the tank cars on the railroad for shipment to the refineries.

The gasoline lines that carry gasoline from the compression or absorption plants in the fields to the shipping or refining points are a new branch of pipe line engineering. Wyoming has eight such lines in use in various fields of this State.

OIL PIPE LINES IN WYOMING

(Revised to September 1, 1930)

Company	Address	Miles	Size	From	To
Atlantic-Pacific Oil Company of Wyoming	Lander, Wyo.	5.00	4"	Derby Dome	Dallas Field
Bolton Oil Company	Denver, Colo.	11.00	6"	Dallas Field	Wyopo
Continental Oil Company	Denver, Colo.	32.00	6"	Bolton Creek	Casper
		6.00	6"	Big Muddy Field	Glenrock
Egaso Operating Co.	Osage	3.00	2"	Osage Field	Osage
Egaso Operating Co.	Osage	6.25	3"	Osage Field	Osage
Egaso Operating Co.	Osage	4.50	4"	Osage Field	Osage
Fargo-Western Oil Co.	Casper	22.50	6"	So. Casper Creek	Casper
Frannie Oil Co.	Lewistown, Mont.	1.48	3"	Frannie Field	Frannie
Illinois Pipe Line Co.	Casper, Wyo.	3.76	3"	Byron	Cowley Junction
Illinois Pipe Line Co.	Casper, Wyo.	63.39	6"	Elk Basin	Greybull
Illinois Pipe Line Co.	Casper, Wyo.	(49.71)	8"		
Illinois Pipe Line Co.	Casper, Wyo.	13.90	6"	Grass Creek	Greybull
Illinois Pipe Line Co.	Casper, Wyo.	15.41	6"	Hamilton Dome	Grass Creek-Greybull
Illinois Pipe Line Co.	Casper, Wyo.	29.10	8"	Oregon Basin	Line Junction
Illinois Pipe Line Co.	Casper, Wyo.	21.43	3"	Pilot Butte	Cody
Illinois Pipe Line Co.	Casper, Wyo.	2.54	8"	Big Muddy	Riverton
Illinois Pipe Line Co.	Casper, Wyo.	30.46	6"	Big Muddy	Casper
Illinois Pipe Line Co.	Casper, Wyo.	14.14	8"	Salt Creek	Glenrock
Illinois Pipe Line Co.	Casper, Wyo.	25.20	8"	Illico	Illico
Illinois Pipe Line Co.	Casper, Wyo.	14.00	6"	Lance Creek	Casper
Illinois Pipe Line Co.	Casper, Wyo.	8.69	3"	Mule Creek	Lusk
Illinois Pipe Line Co.	Casper, Wyo.	4.43	3"	Osage Field	Dakoming
Illinois Pipe Line Co.	Casper, Wyo.	38.11	6"	Dutton Creek	Clay Spur
Illinois Pipe Line Co.	Casper, Wyo.	7.57	6"	Rock Creek	Rock Creek-Laramie
Illinois Pipe Line Co.	Casper, Wyo.	1.87	6"	Rock Creek	Laramie
Illinois Pipe Line Co.	Casper, Wyo.	9.00	6"	Rex Lake	Rock River
†Lowell Refinery, The	Lowell, Wyoming	(44.50)	3"	Byron	Hutton
Midwest Refining Co.	Casper, Wyo.	(10.15)	6"	Casper	Lovell
Midwest Refining Co.	Casper, Wyo.	38.00	4"	LaBarge	Salt Creek
Midwest Refining Co.	Casper, Wyo.	7.50	2"	Notches	Opal
Midwest Refining Co.	Casper, Wyo.	(25.80)	8"	Salt Creek	Lox
		(16.60 db.)	6"		Casper

OIL PIPE LINES IN WYOMING—(Continued)

(Revised to September 1, 1930)

Company	Address	Miles	Size	From	To
Midwest Refining Co.	Casper, Wyo.	(25.80)	8"	Salt Creek	Casper
Midwest Refining Co.	Casper, Wyo.	(15.60 db.)	6"	Salt Creek	Casper
Midwest Refining Co.	Casper, Wyo.	(29.80 db.)	8"	Salt Creek	Greybull
New York Oil Company (Central Pipe Line Co.)	Casper, Wyo.	(14.28 db.)	6"	Torchlight	Texas and White Eagle Refineries
Northwestern Petroleum Company	Casper, Wyo.	11.00	3"	Casper	Eagle Refineries
Producers & Refiners Corporation	Osage, Wyoming	10.40	8"	Casper	Osage
Producers and Refiners Corporation	Parco, Wyo.	1.50	2"	Osage Field	Prairie Storage
Producers and Refiners Corporation	Parco, Wyoming	6.00	4"	Ft. Steele	Parco
Producers and Refiners Corporation	Parco, Wyoming	(95.76)	6"	Salt Creek	Parco
Producers and Refiners Corporation	Parco, Wyoming	(37.72)	8"	Salt Creek	White Eagle Refinery
Producers & Refiners Corporation	Parco, Wyo.	6.25	6"	Casper	Hanna
Producers and Refiners Corporation	Parco, Wyo.	10.00	3"	Simpson Ridge	Ferris
Shaffer, C. E.	Parco, Wyoming	19.62	6"	Lost Soldier	Thermopolis
Sinclair Pipe Line Co.	Thermopolis, Wyoming	9.00	4"	Warm Springs	Nebraska-Wyoming State Line
	Casper, Wyoming	(90.26)	12"		
		(37.58)	10"	Teapot Dome	
		(34.97)	8"		

*Idle

†Abandoned since last report.

GAS PIPE LINES IN WYOMING

(Revised to September 1, 1930)

Field	Market	Company	Use	Miles	Size	Total Mileage
Baxter Basin and Hiawatha	Salt Lake City, Utah	Western Pub. Service Corp. (The Ohio Oil Co.)	Domestic and Industrial	16.00	8"	
Baxter Basin	Rock Springs, Wyoming	New York Oil Co. (Northern Utilities Co.)	(Complete System)	33.00	10"	306.00
Billy Creek	Buffalo-Sheridan	Minn. Northern Power Co.	Domestic	40.00	14"	16.00
Boone Dome	Casper	New York Oil Co.	Domestic and Industrial	95.00	16"	49.26
Byron	Byron	Byron Gas Company	Branch of Sand Draw-Casper Line	1.50	6" & 8"	16.50
Byron	Lovell	Rocky Mountain Gas Co. (The Ohio Oil Co.)	Domestic	8.00	2"	1.50
Byron (Branch Lovell Line)	Cowley	Rocky Mountain Gas Co. (The Ohio Oil Co.)	Domestic and Industrial	6.00	6 5/8"	8.00
Byron	Powell	Rocky Mountain Gas Co. (The Ohio Oil Co.)	Domestic	5.80	2"	6.00
Eight Mile Lake Dome	Parco	Producers & Refiners Corp.	Domestic	5.35	4"	5.80
Elk Basin	Billings, Montana	Gallatin Gas Company	Domestic and Refinery	14.40	6"	11.15
Golden Eagle	Thermopolis, Wyoming	(The Ohio Oil Co.)	Domestic and Industrial	37.50	8"	14.40
Hidden Dome	Basin and Greybull	Mountain States Power Co. (The Ohio Oil Co.)	(Complete System)	28.10	10"	66.60
Little Buffalo Basin	Greybull	Midwest-Wyoming Gas Co. Big Horn Gas Company	Domestic	20.00	6"	20.00
Little Buffalo Basin	Worland	Big Horn Gas Company	Standard-Midwest Refineries	34.30	8"	34.30
Little Buffalo Basin (Branch of Greybull Line)	Golden Eagle Field	Big Horn Gas Company	Domestic and Industrial	.64	10"	
Mahoney-Wertz-Ferris	Casper	Producers & Refiners Corp.	Domestic	18.56	12"	73.95
Mahoney	Parco	Mountain States Power Co.	For Thermopolis Line	59.75	14"	
Mahoney	Rawlins	Producers & Refiners Corp. and Midwest Refining Co.	Standard-Midwest Refineries	11.10	8"	11.10
Mahoney (Branch Mahoney-Rawlins)	Parco	Prairie Oil & Gas Co. Rocky Mountain Gas Co. (The Ohio Oil Co.)	P. & R. Refinery	13.80	4"	13.80
		Producers & Refiners Corp.	Domestic	17.90	10" db.	
			Domestic	28.20	12"	
			Domestic	48.60	14"	89.70
			Domestic	32.60	8" & 10"	32.60
			Domestic	24.31	8"	28.18
			Domestic	3.87	8"	
			Domestic	7.60	8"	7.60

GAS PIPE LINES IN WYOMING—(Continued)

(Revised to September 1, 1930)

Field	Market	Company	Use	Miles	Size	Total Mileage
Oregon Basin	Cody	Rocky Mountain Gas Co. (The Ohio Oil Co.)	Domestic and Industrial	12.80	4"	12.80
*Salt Creek	Casper	Midwest Refining Co.	Refineries	41.30	10"	41.30
Sand Draw	Casper	New York Oil Co. (Northern Utilities Co.)	Domestic and Industrial	43.65	10"	96.40
Sand Draw (Muskrat connection)	Casper	New York Oil Co. (Northern Utilities Co.)	Domestic and Industrial	52.75	12"	2.00
Sand Draw-Casper Line extension	Glenrock	New York Oil Co. (Northern Utilities Co.)	Domestic and Refineries	2.00	4"	19.90
Sand Draw	Riverton and Lander	New York Oil Co. (Northern Utilities Co.)	Domestic	19.90	10"	
†Teapot	Casper	New York Oil Co. (Northern Utilities Co.)	Domestic	10.00	4"	45.80
Colorado-Wyo. State Line (Amarillo-Denver extension)	Cheyenne	Central Pipe Line Co. (New York Oil Co.)	Domestic and Industrial	35.80	6"	35.40
Cheyenne Extension	Ft. F. E. Warren	Colorado-Wyoming Gas Co.	Domestic and Industrial	35.40	6" & 8"	10.40
		Colorado-Wyoming Gas Co.	Domestic	10.40	6"	
			Domestic	2.34	4"	2.34

*Idle
†10.40 miles of this line carrying oil from Tank Farm near Casper to Texas and White Eagle Refineries at Evansville; balance of line idle.

GASOLINE PIPE LINES IN WYOMING

(Revised to September 1, 1930)

Field	Destination	Operator	Transports	Size	Miles
*Elk Basin	Frankie	Midwest Refining Company	Natural Gasoline	2"	11.85
Grass Creek	Chatham	The Ohio Oil Company	Natural Gasoline	3"	28.00
Lance Creek	Manville	The Ohio Oil Company	Natural Gasoline	2"	19.48
*Rock Creek	Rock River	The Ohio Oil Company	Natural Gasoline	2"	10.50
*Salt Creek	Casper	Midwest Refining Company	Naptha	3"	39.45
*Salt Creek	Midwest Gas Plant	The Ohio Oil Company	Natural Gasoline	4"	39.75
*Salt Creek	Midwest Gas Plant	Continental Oil Company	Natural Gasoline	3"	3.00
*Salt Creek	Salt Creek (Town)	Continental Oil Company	Natural Gasoline	2"	3.75

*Idle

Gasoline Plants

The lighter hydrocarbons that compose a large part of the petroliferous deposits of the Wyoming oil fields, are capable of carrying the lighter oils found in the crude oil, in suspension and as a gas. These constituents can be removed by compression, absorption, refrigeration and other processes, but in the main, the compression and absorption processes are in use in the State of Wyoming.

In the compressor process, the natural gas containing the gasoline is passed through a compressor or series of compressors that raise the pressure of the gas to certain points. At these points, the natural gas vapor condenses in part and the resultant liquid or naptha is removed, through suitable piping and mechanical devices, to storage and market.

In the absorption process, the well known law of physics relating to gases is employed; a column of gas ascending in a tower or other suitable container, meets with an absorbing medium, usually a mineral seal oil, which medium absorbs the naptha content of the gas and same is later removed by distillation or other methods.

The gasoline obtained by the above processes is usually of such high gravity when it comes from the compressors or absorber stills, that it requires treatment called weathering to reduce the content of the gaseous hydrocarbons that have been combined with the naptha in the process of removal from the natural gas vapor. In weathering, the naptha is allowed to give off its lighter constituents until its gravity is reduced to about the gravity the market demands. It is also often mixed with the heavier gasolines from the distillation of crude oil and used to raise the gravity of the latter to such points as the market demands.

NATURAL GASOLINE PLANTS IN WYOMING

(Revised to September 1, 1930)

Operator	Location	Type of Plant	Daily Capacity Gallons
*Producers & Refiners Corp.	Casper	Absorption	7,000
†Standard Engineering Co.	Evansville	Absorption	2,500
‡Midwest Refining Company	Elk Basin	Compression	10,000
The Ohio Oil Company	Grass Creek	Compression	6,000
The Ohio Oil Company	Lance Creek	Absorption	4,900
The Ohio Oil Company	Rock Creek	Absorption	4,000
Midwest Refining Company	Salt Creek	Compression	100,000
The Ohio Oil Company	Salt Creek	Absorption	12,000
Continental Oil Company	Salt Creek	Absorption	14,500
New York Oil Company	Sand Draw	Absorption	1,500
‡New York Oil Company	Teapot Dome	Compression	2,000

*Gas from Ferris-Mahoney-Wertz Fields.

†Abandoned since last report.

‡Used only in connection with gas drive in field.

‡Idle—To be abandoned.

Carbon Black Plants

In the manufacture of carbon black, natural gas is burned in a condition of imperfect combustion wherein the flame gives off a maximum of soot. This soot is collected by suitable mechanical means, placed in bags or barrels and shipped to market. Only one plant was in operation in Wyoming in the fall of 1928, this is located in the Lance Creek Field in Niobrara County and there were three plants shut down.

CARBON BLACK PLANTS IN WYOMING

(Revised to September 1, 1930)

Operator	Location	Daily Capacity Cubic Feet	Average Recovery Per M. Cubic Feet
J. M. Huber Company of Louisiana, Inc.	Lance Creek	12,000,000	1.8 lbs.
*Preston, et al	Cowley	No data	No data
*Wilson, et al	Golden Eagle	No data	No data
*Teton Gas Products Co.	Riverton	6,000,000	1.8 lbs.

*Abandoned since last report.

Refineries

The refining of petroleum came into existence with the early production of oil in Pennsylvania. Even before the drilling of the first wells, chemists had experimented with samples taken from oil springs and seeps and had found that it could be distilled and cut into different products through this distillation process. However, the refining industry had its problems as well as the developing of the fields and some of these problems still present only a partial solution or makeshift operation to gain the required end.

Different grades of crude oil require different treatment, some crude oils can be passed directly into a steam still for their gasoline content while others, especially the asphaltic oils, require fire heated stills and the cracking process to obtain the maximum content of gasoline. The fields of the State of Wyoming produce oils of all grades so that the refiners of this State may select any crude oil they wish to use, if the transportation of same does not complicate its economical use.

One of the early problems of the refiners of petroleum was the removal of sulphur from the petroleum oils. This still presents difficulties today and some of the Wyoming oils are rich in sulphur, making these very objectionable to the small plant where the facilities for treating for sulphur are inadequate. Sulphur distills over in the retort much like oil itself and is always found in the resultant gasoline

when proper safeguards are not taken for its removal. In the automobile engine, the use of gasoline loaded with sulphur is extremely corrosive to the cylinder walls and therefore objectionable.

The danger from gasoline with a high sulphur content is much more pronounced in cold weather than during the warm summer months and at temperatures near zero, the corrosion of iron or steel takes place very rapidly with a gasoline have a high sulphur content. At many small refineries and skimming plants, the cold months of winter enable the condensers to function better than during the warm season and thus a larger content of sulphur is carried over in the distillation process.

At Franklin, Pennsylvania, there is a relatively small production of a certain grade of oil from wells on the outskirts of that city that is unequalled for lubrication purposes anywhere in the world. For many years this production has been controlled by the Galena Signal Oil Company and its subsidiary companies and the oil is utilized for special trades and machines.

With the single exception of this high grade oil, the fields in the State of Wyoming can produce oils of a quality equal to any other fields in the nation and with the care, experience and equipment, lubricating oils, the equal of any grade refined in this country can be had here in the State of Wyoming.

It is noted that through great advertising campaigns, lubricating oils from refining points in the east have supplanted in part, the lubricating oils refined in the State of Wyoming, although the former oils must pay a heavy transportation cost across the county to reach this market. The motorists from the East appear to help this trade by asking for the eastern lubricating oils and some unfortunate examples of faulty lubrication due to improperly refined oils has worked against the marketing of the lubricating products of the State of Wyoming, giving same a bad name that is undeserved.

In the process of refining gasoline and kerosene products of petroleum, these grades are placed in contact with sulphuric acid to remove small particles in suspension, of the heavier hydrocarbons. It is very necessary that all traces of this sulphuric acid be removed by thorough washing and neutralizing with soda, but in a few instances, probably due to the heavy market demands at a rush season, some kerosene and gasoline has reached the market containing a percentage of sulphuric acid. This has resulted in the ruin of oil stoves and the pitting and corrosion of

motors and a resultant depreciation of the reputation of petroleum products refined from Wyoming oils.

The State Oil and Gas Inspector has heard much objection voiced against the use of oil products imported from other states, by the oil producers of this State. The black oils of Wyoming show the same chemical analyses as the asphaltic oils of other states and therefore should refine into the same products.

In the boom period of Wyoming's oil history, notably during the years of 1917, 1918 and 1919, many small refining plants were built in anticipation of a great flood of crude. Some of these plants were built by experienced men or firms, but in many instances the refineries were abortive attempts on the part of promoters or parties without any experience in the business of refining oil.

Most of these small plants have been definitely abandoned now and the buildings are falling into decay while the machinery and other equipment that presented some value have been moved away.

Aggregate charging capacity of Wyoming oil refineries was increased last year by completion of a 3,000-barrel plant of the Texas Company at Cody and additions which increased the capacity of the Casper plant of the White Eagle Oil & Refining Company from 3,000 to 5,000 barrels. A small plant was moved from Thermopolis to Pedro by the Mere Oil Company. Improvements were made in other plants, including process changes by the Standard Oil Company of Indiana at Casper and elsewhere. Refineries are listed as follows:

REFINERIES IN WYOMING
(Revised to September 1, 1930)

OPERATOR	Location	Daily Crude Capacity 42 Gal. Bbls.	Type of Refining Plant	Daily Cracking Capacity 42 Gal. Bbls.	Type of Cracking Units
Midwest Refining Company	Casper	50,000	Light Oils and Lubricants		Burton
Standard Oil Co. (Indiana)	Casper	7,000	Light Oils and Lubricants	30,000	Holmes-Manley
The Texas Company	Casper	5,000	Light Oils	9,400	Holmes-Manley
White Eagle Oil Corporation	Casper		Light Oils	5,000	Jenkins
G. F. Beck & Son, Osage, Wyoming	Clay Spur	83	Light Oils		White Eagle
The Texas Company	Cody	3,000	Black Oils	1,500	Holmes-Manley
Gillette Refinery	Gillette	200	Light Oils		Burton
Continental Oil Company	Glenrock	10,000	Light Oils	3,600	Burton
Standard Oil Co. (Indiana)	Glenrock		Light Oils	3,508	
Wyoming Producing and Refining Company	Grass Creek	125	Light Oils		Burton
The Ohio Oil Company	Greybull	1,000	Light Oils		Burton
Midwest Refining Company	Greybull	13,000	Light Oils	4,680	
Standard Oil Co. (Indiana)	Laramie	5,000	Light Oils		Burton
Standard Refining Company	Laramie		Light Oils	3,100	
The Lovell Refinery	Lovell	600	Light Oils		
The Ohio Oil Company	McFadden	10	Light Oils		
Pierce Producing and Refining Company	Moorecroft	20	Light Oils		
Osage Operating Company	Osage	1,000	Light Oils	1,000	Cross
Northwestern Petroleum Co.	Osage	300	Light Oils		
Star Refining Company	Osage	28	Light Oils		
Wyo Gas & Oil Company, Upton, Wyoming	Osage	100	Light Oils		
Producers & Refiners Corp.	Parco	8,000	Light Oils	4,000	Dubbs
The Ohio Oil Company	Parkerton	10	Light Oils		
Hole's Pedro Refinery	Pedro	500	Light Oils		
Midland Oil Refining Co.	Riverton	2,000	Light Oils		
Interstate Oil & Refining Co., Hot Springs, South Dakota	West Mule Creek	30	Light Oils		
Wyoming Oil Products Co., J. Edson Himes, President	Green River	40 Tons	Shale Oils	40 Gal. per ton	Trumbell Pat.

*Idle

†Building

CHAPTER XIII

MISCELLANEOUS DATA

List of Operators on State and Patented Lands in Wyoming

Name and Address	Field
Ackard, John Orin, Wyoming	Ackard Twin Five, Morton Ranch
Adams, W. S. Evanston, Wyoming	Yellow Creek
All States Development Company Casper, Wyoming	North Casper Creek
Allen Oil Company Billings, Montana	Byron
Argo Oil Company First Nat'l. Bank Bldg., Denver, Colo.	Salt Creek
Atlantic-Pacific Oil Co. (Dallas Dome- Wyoming Oilfields Company)	Dallas and Derby
Lander, Wyoming	
Ball Oil Company Big Piney, Wyoming	LaBarge-Dry Piney
Bock, Gerald Osage, Wyoming	Osage
California Company Box 1125, Kemmerer, Wyo.	Muddy Creek
California Exploration Co. Cody, Wyoming	Fourbear
Carter, A. A., et al. Newcastle, Wyoming	Pedro
Connell Exploration Oil Co. Box 374, Ogden, Utah	Spring Valley
Carter Oil Company Midwest, Wyoming	Billy Creek
Continental Oil Company Denver, Colorado	Elk Basin, Maverick Springs, Oregon Basin
Converse Oil Company Douglas, Wyoming	Brenning Basin
Corey, M. O. Box 16, Cumberland, Wyoming	LaSalle
Curtis, H. D. and Dorsey E. Straitiff 613 E. 11th St., Casper, Wyoming	Notches
Delta Oil Company	Pilot Butte
Elton Oil Company Colorado Springs, Colorado	Osage
Enalpac Oil & Gas Co. c/o Wilfrid O'Leary, Cheyenne, Wyo.	Oregon Basin
Ensign Oil Company 302 Vermont Bldg., Salt Lake City, Utah	South Spring Valley
Equitable Oil Company Osage, Wyoming	Pedro
Fall River Royalties & Producers Hot Springs, South Dakota	West Mule Creek
Globe Petroleum Company H. E. Briggs, Osage, Wyoming	North Mule Creek

Name and Address	Field
Golden West Oil Company Casper, Wyoming	North Casper Creek
Grebo Royalties Company First Nat'l. Bank Bldg., Denver, Colo.	Little Buffalo Basin
Groth, L. F. 259 N. Woodlawn Ave., Decatur, Illinois	Salt Creek
Henderson, J. B. 401 Securities Bldg., Billings, Montana	Elk Basin
Holmon & Gates c/o Teton Hotel, Riverton, Wyoming	Alkali Butte
Hudson Oil Company c/o Midwest Refining Co., Casper, Wyoming	Hudson
Hughes, W. C. c/o Henning Hotel, Casper, Wyoming	Salt Creek
Indian Petroleum Co. Rawlins, Wyoming	Lance Creek
Jones, Edgar B. Newcastle, Wyoming	Osage
Kelso Oil Company Osage, Wyoming	Osage
Kinney-Coastal Oil Co. Riverton, Wyoming	Pilot Butte
LaBarge Development Co. Calpet, Wyoming	LaBarge
LaFleiche Oil Company Osage, Wyoming	Osage
Lambie Oil Company Osage, Wyoming	Osage
Lease & Gardner Osage, Wyoming	Osage
Manlove, J. C. Osage, Wyoming	Osage
Merritt Oil Company Parkerton, Wyoming	Big Muddy
Midwest Refining Company Casper, Wyoming	Dutton Creek, Elk Basin, Frannie, Grass Creek, Salt Creek, Elk Mountain
Mountain Fuel & Supply Co. Rock Springs, Wyoming	Baxter Basin
Mountain Oil Corporation Kemmerer, Wyoming	Mountain-Wyoming
Mouser, M. K. Osage, Wyoming	Osage
McCaslin, W. E. 1016 Lawrence St., Los Angeles, Calif.	Aspen
McCullough, James Newcastle, Wyoming	Osage
Newlon, Edna M. Box 1065, Kemmerer, Wyoming	LaBarge
Nutting, H. L. Bairoil, Wyoming	Buck Springs

Name and Address	Field
Ohio Oil Company Casper, Wyoming	Big Muddy, Baxter Basin, Byron, Cody, Elk Basin, Grass Creek, Hidden Dome, Lance Creek, Mahoney Dome, Mule Creek, Rex Dome, Rock River, Salt Creek.
Omaha Oil Syndicate, Inc. Osage, Wyoming	Osage
Osage-Wyoming Oil Company Osage, Wyoming	Osage
Park Bowser & W. H. Satterfield Lusk, Wyoming	Sage Creek
Park City Oil & Gas Syndicate Box 66, Lyman, Wyoming	Lyman
Prairie Oil & Gas Co. Parco, Wyoming	Lost Soldier, Salt Creek
Premier Oil Company A. G. Burritt, Ferris Hotel, Rawlins, Wyo.	Crooks Gap
Producers & Refiners Corporation Parco, Wyoming	Baxter Basin, Ferris, Hatfield, Muskrat, O'Brien Springs, Sand Draw, Simpson Ridge, Torchlight
Peterson, Oscar Evanston, Wyoming	Spring Valley
Quad-States Enterprises, Inc. Commerce Bldg., Kansas City, Mo.	Quad-States
Resolute Oil Company Star Route, Belfry, Montana	Badger Basin
Rispin, Henry Allen Capitola, Calif.	Spring Valley
Rocky Mountain Gas Co., (Cross Gas Co.) Lovell, Wyoming	Byron
Scoville's, Incorporated 2433 Grant Ave., Ogden, Utah	Baxter Basin
Shaffer, C. B. Thermopolis, Wyoming	Warm Springs
Slagle, Spear & Zinn Basin, Wyoming	Torchlight
Smith, C. Leonard First Nat'l. Bank Bldg., Denver, Colo.	Osage
Sweetwater Oil Co. Rawlins, Wyoming	Little Lost Soldier
Texas Production Co. Casper, Wyoming	Alkali Butte
United Oil Company Box 836, Casper, Wyoming	Crazy Woman
Updike, Hugh Osage, Wyoming	Osage
Updike & Briggs Osage, Wyoming	Fiddler Creek
Utah Oil Refining Co. Salt Lake City, Utah	Black Mountain
Vermillion Oil Company Rock Springs, Wyoming	Hiawatha (Wilson Dome)

Name and Address	Field
Walker, J. W., et al. Newcastle, Wyoming	Pedro
Weisman, M. C. c/o Henning Hotel, Casper, Wyoming	Big Muddy
Wesco Oil Company Osage, Wyoming	Osage
Wilcox, Frank c/o Amelia Ramsay, Evanston, Wyoming	Spring Valley
Wilhite, Hoyt & Landis Edgmont, South Dakota	Mule Creek
Winston Oil Company 913 Bank of Italy Bldg., Los Angeles, Calif.	Piedmont Dome
Wyo-California Petroleum Co. 1002 Rowan Bldg., Los Angeles, Calif.	Baxter Basin
Wyoming Oil & Gas Co. Osage, Wyo.	Osage
Wyomont Prod. & Ref. Co. Glenrock, Wyoming	Big Muddy
Yellowstone Oil Company Lander, Wyoming	Bonneville

Mineral Resources of Wyoming

From Estimates of United States Geological Survey and State Geologist

Coal	1,076,620,100,000 Tons	@	\$0.10	\$107,682,010,000
Oil	553,500,000 Bbls.		2.00	1,107,000,000
Oil Shale	20,000,000,000 Bbls.		2.00	40,000,000,000
Gas	7,000,000,000,000 Cu. Ft.		0.10	700,000,000
Iron Ore	500,000,000 Tons		1.00	500,000,000
Phosphates	200,000,000 Tons		1.00	200,000,000
Potash and Alumina	1,973,000,000 Tons		0.20	394,700,000
Metallic Minerals—Gold, Silver, Copper, etc., estimated				51,250,000
Other Minerals, Asbestos, Mica, Platinum, Graphite, Sulphur, Sodas, Gypsum, Clays, Building Stone, Limestone, etc., estimated				1,000,000,000
Total				\$151,634,960,000

List of Wyoming Territorial and State Geologists

TERRITORIAL		
Name	Politics	Term
F. J. Stanton	Republican	1881-1882
G. E. Bailey	Republican	1882-1885
Samuel Aughey	Democrat	1885-1887
L. D. Ricketts	Democrat	1887-1891
STATE		
Vacant		1891-1901
Henry C. Beeler	Republican	1901-1909
Edwin Hall	Republican	1909-1911
C. E. Jamison	Democrat	1911-1915
L. B. Trumbull	Democrat	1915-1919
G. B. Morgan	Republican	1919-1923
A. B. Bartlett	Democrat	1923-1927
John G. Marzel	Republican	1927-Date

Altitude of Principal Cities of Wyoming

	Feet		Feet
Afton	6,258	Lovell	3,800
Basin	3,862	Lusk	5,007
Buffalo	4,635	Moorcroft	4,203
Casper	5,101	Newcastle	6,666
Cheyenne	6,101	Pinedale	7,167
Cody	5,011	Powell	4,400
Douglas	4,815	Rawlins	6,786
Evanston	6,743	Riverton	4,950
Gillette	4,538	Rock Springs	6,261
Glenrock	4,900	Sheridan	3,737
Green River	6,082	Shoshoni	5,000
Greybull	3,800	Sundance	4,750
Guernsey	4,361	Thermopolis	4,200
Jackson	6,698	Torrington	4,098
Kemmerer	6,908	Upton	4,229
Lander	5,372	Wheatland	4,747
Laramie	7,159	Worland	4,109

Altitude of Mountains, Peaks and High Points in Wyoming

	Feet		Feet
Ames Monument	8,283	Devils Tower	5,117
Atlantic Peak	12,794	Downs Mountain	13,344
Bald Mountain	10,041	Eagle Nest	5,011
Battle Mountain	8,991	Elk Mountain	11,162
Bear Creek Mountain	5,320	Fortress Mountain	12,073
Black Mountain	11,600	Franks Peak	12,140
Black Mountain	10,165	Fremont Peak	13,730
Blacktooth	13,014	Gannett Peak	13,785
Breccia Peak	11,007	Garfield Peak	8,200
Bridger Peak	11,007	Grand Teton	13,747
Mt. Chauvenet	13,000	Gravel Peak	9,645
Cloud Peak	13,165	Gros Ventre Rg.	12,200
Dead Indian Peak	12,253	Mt. Helen	13,600
Mt. Hooker	12,900	Index Peak	11,740
Inyankara Mountain	6,313	Ishawooa Cone	11,840
Jelm Mountain	9,665	Laramie Peak	11,000
Mt. Leidy	10,317	Medicine Bow Peak	12,005
Needle Mountain	12,130	Obsidian Cliff	7,800
Pole Mountain	9,100	Red Tops	12,202
Sailor Peak	10,046	Sheep Mountain	11,190
Mount Sheridan	10,385	Table Mountain	10,800
Temple Peak	13,249	The Needles	9,700
Wagners Peak	10,809	Washakie Needles	12,496
Mt. Washburn	10,346	Wind River Peak	13,499
Wyoming Peak	11,490	Younts Peak	12,165

List of Publications

John G. Marzel, State Geologist,
Cheyenne, Wyoming

Mineral:

- *Albany County: Beeler, 1906.
- *Grand Encampment Copper District: Beeler, 1905.
- *Laramie Peak Copper District: Beeler, 1904.
- *Mines in 1907: Beeler, 1908.
- *South Pass Gold District: Beeler, 1903.
- *South Pass Gold District: Beeler, 1904.
- South Pass Gold District: Beeler, 1908.
- *Bull. 1, Mineral Resources: Jamison, 1911.
- *Bull. 7, Atlantic City Gold District: Trumbull, 1914.
- *Press Bull. 10, Mineral Resources: Morgan, Oct. 1, 1920.
- *Bull. 21, Developed and Undeveloped Resources: Dietz, 1928.

Miscellaneous:

- *State Geologist's Report: Beeler, 1903.
- *Bull. 6, Mining Laws: Trumbull, 1913.
- *Bull. 9, Biennial Report, 1913-14: Trumbull, 1915.
- *Bull. 16, Mining Laws: Trumbull, 1917.
- *Bull. Bibliography and Index: 1918.
- Bull. 18, Mining Laws, State and Federal: Morgan, 1921.
- Bull. 19, Mineral Hot Springs of Wyoming: Bartlett, May 6, 1926.
- Bull. 20, Atlantic City South Pass Gold Mining District: Bartlett, July 15, 1926.
- Map, State Topographic, 1000 ft. contour: Price \$1.09.
- *Map, State Geologic: April 1, 1921.
- *Map, Wyo. Oil and Gas Fields, U. S. G. S., 1921.
- Bull. 22, Dinosaurs of Wyoming: Dr. Roy L. Moodie, 1930, Price \$1.50.

Oil:

- *Bull. 2, Fremont County (Lander Field): Jamison, 1911.
- *Bull. 3-a, Douglas Oil Field: Jamison, 1912.
- *Bull. 3-b, Muddy Creek Oil Field: Jamison, 1912.
- *Bull. 4, Salt Creek Oil Fields: Jamison, 1912.
- *Bull. 5, Prospective Oil Fields, Trumbull, 1913.
- *Bull. 8, Salt Creek Oil Fields: Trumbull, 1914.
- *Bull. 10, Basin-Greybull Oil and Gas Fields: Hintze, 1915.

- *Bull. 11, Pt. 1, Little Buffalo Basin Gas Fields: Hintze.
- Pt. 2, Grass Creek Oil & Gas Field: Hintze, 1915.
- Circular No. 5 and Supplement No. 1, Operating Regulations to Govern the Production of Oil and Gas on State and Patented Lands in the State of Wyoming: Marzel, 1929.
- *Bull. 12, Light Oil Fields: Trumbull, 1916.
- *Bull. 13, Pilot Butte Oil Field: Ziegler, 1916.
- Bull. 14, Byron Oil and Gas Field: Ziegler, 1917.
- Bull. 15, Oregon Basin Gas Field: Ziegler, 1917.
- *Sci. Ser., Bull. 1, Pt. 1, Petroleum in Granite.
- Pt. 2, Effect of Structure Upon Migration of Oil: Trumbull, 1916.
- *Map, Big Muddy-Douglas Oil Field: Trumbull, 1915.
- Map, Rock Springs Uplift, (Dry Lake Dome: Trumbull, 1915).
- *Press Bull. 2, Rawlins and Vicinity: Morgan.
- *Press Bull. 4, Laramie Basin: Morgan, Oct. 24, 1919.
- *Press Bull. 7, Rock Cr. Oil Field: Morgan, April 1, 1920.
- *Press Bull. 8, Osage-Newcastle Oil Field: Morgan, July 8, 1920.
- *Press Bull. 9, Dry Piney-LaBarge Oil Field: Morgan, Aug. 1920.
- *Press Bull. 11, Fossil Oil Field: Morgan, Aug. 1921.
- *Press Bull. 14, Present Condition of Oil and Gas Developments of Big Horn Basin: Bartlett, 1923.
- Press Bull. 15, Oil and Gas Developments of Laramie-Medicine Bow District: Bartlett, 1924.

Biennial Reports:

- Eleventh Biennial Report: Morgan, 1922.
- Twelfth Biennial Report: Bartlett, 1924.
- Thirteenth Biennial Report: Bartlett, 1926.
- Fourteenth Biennial Report: Marzel, 1928.

*Out of print.

PRODUCTION OF CRUDE OIL IN WYOMING

(In barrels of 42 U. S. Standard Gallons)

Field	Year of Discovery	Kind of Oil	1883-1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	Accumulated Production
Alkali Butte	1927	Light																				7,720
Ant Hill	1927	Black																				9,942
Baxter Basin	1924	Black																				3,008
Big Muddy	1915	Light																				20,317,195
Black Mountain	1928	Black																				3,324
Bolton Creek	1920	Black																				47,086
Byron	1906	Light																				299,597
Cody Structure	1927	Black																				2,710
Dallas-Derby	1883 to 1913	Black	150,000			27,385																982,848
Dry Flacy	1928	Light																				11,945
Dutton Creek	1915	Light																				38,186
Elk Basin	1918	Light																				9,211,405
Ferris-G. P. Dome	1928	Light																				252,707
Four Bear	1927	Black																				2,696
Frannie	1927	Black																				75,148
Grass Creek	1914	Black																				75,148
Greybull	1907	Light																				21,429,711
Hamilton Dome	1913	Black																				779,728
Houston (Lander)	1914	Black																				233,678
Iron Creek	1914	Black																				329,479
La Barge	1924	Light																				104,907
Lake Creek	1926	Black																				8,944
Lane Creek	1915	Light																				1,757,319
Lost Soldier	1915	Light																				9,184
Madison Dome	1926	Black																				3,981,515
Madison Springs	1919	Black																				12,484,212
Maple Creek	1923	Black																				191
Natchez	1927	Black																				3,268
Oregon Basin	1920	Black																				1,161,208
Ossage	1926	Black																				169,291
Pedro	1926	Black																				2,345,023
Pilot Butte	1916	Light																				1,717,696
Pine Mountain	1920	Black																				455,707
Poison Spider	1920	Black																				229,522
Power River	1925	Black																				95
Rex Lake	1923	Light																				197,202
Rock Creek	1918	Light																				12,411,246
Salt Creek	1908	Light																				217,642,618
Shannon	1889	Light	51,798	1,157,899	2,254,946	3,379,320	3,935,328	4,000,433	3,840,502	5,512,992	6,208,716	10,255,410	12,378,689	19,261,117	35,301,608	30,831,703	21,590,607	17,874,624	14,352,792	14,041,030	11,312,094	55,441
Shoshone	1927	Black																				1,408
Shoshone Anticline	1924	Black																				188,088
Simpson Ridge	1924	Black																				33,779
South Casper Creek	1922	Black																				1,520,777
South Sunshine	1926	Black																				7,572
Sunshine	1927	Black																				3,015
Spring Valley	1903	Light																				99,493
Trapot Dome	1922	Light																				2,807
Trapot (Outside)	1927	Light																				3,550,227
Unlight	1915	Light																				133,241
Warm Springs	1917	Black																				189,851
West Male Creek	1928	Light																				382
Total	Production by years		51,798	1,157,899	2,454,946	3,422,026	4,135,937	6,321,482	8,773,075	12,798,778	12,499,893	17,169,189	19,668,942	26,773,937	44,395,704	39,623,234	29,651,042	25,411,426	21,178,719	21,485,484	19,180,584	317,150,045

GROSS PRODUCTION OF CRUDE OIL ON STATE LAND, BY FIELDS
(In barrels of 42 U. S. Standard Gallons)

FIELD	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	Total 1911-1920
Baxter Basin	---	---	---	---	---	---	---	---	---	---	---
Big Muddy	---	---	---	---	15,324.38	---	389,506.00	1,767,722.42	1,480,588.47	998,802.88	4,651,894.15
Black Mountain	---	---	---	---	---	---	---	---	---	---	---
Elk Basin	---	---	---	---	---	---	341.80	6,754.28	10,546.72	7,275.15	24,917.95
Ferris	---	---	---	---	---	---	---	---	1,473.70	14,342.15	15,815.85
Four Bear	---	---	---	---	---	---	---	---	---	---	---
Grass Creek	---	---	---	---	45,766.75	452,941.78	1,045,737.90	1,003,506.67	678,484.06	518,329.44	3,744,765.70
Lance Creek	---	---	---	---	---	---	---	540.00	249,488.83	49,713.92	299,742.75
Oregon Basin	---	---	---	---	---	---	---	---	---	---	---
Osage	---	---	---	---	---	---	---	---	---	2,732.59	2,732.59
Pine Mountain	---	---	---	---	---	---	---	---	---	7.00	7.00
Rock Creek	---	---	---	---	---	---	---	---	79,782.94	378,126.76	457,909.70
Salt Creek (36-40-79)	973.00	433,304.00	511,933.00	483,638.00	497,368.00	435,724.00	647,845.00	781,611.61	654,062.89	1,348,413.13	5,799,872.63
Salt Creek (16-40-79)	---	---	---	2,694.00	3,632.50	2,245.00	1,576.00	2,061.97	12,778.50	40,880.89	65,868.86
Salt Creek (16-39-78)	---	---	---	---	---	---	---	31,418.70	46,658.35	16,508.41	94,585.46
Warm Springs	---	---	---	---	---	---	---	---	---	---	---
Totals	973.00	433,304.00	511,933.00	486,332.00	546,767.25	906,285.16	2,085,005.80	3,593,615.65	3,213,814.46	3,375,132.32	15,158,112.64

Production figures submitted to Commissioner of Public Lands upon which royalty settlements were made.

GROSS PRODUCTION OF CRUDE OIL ON STATE LAND, BY FIELDS
(In barrels of 42 U. S. Standard Gallons)

FIELD	1921	1922	1923	1924	1925	1926	1927	1928	1929	Total 1911-1929
Baxter Basin				3,008.09						3,008.00
Big Muddy	987,165.42	669,678.41	624,737.82	524,579.36	462,390.47	464,083.86	494,408.54	474,161.47	385,958.41	9,729,057.91
Black Mountain			3,217.39	10,131.53	11,220.72	5,349.48	432.00		648.50	30,999.62
Elk Basin	6,011.73	5,521.85	4,646.45	5,221.74	5,449.68	5,727.43	4,158.05	3,853.54	3,754.50	69,262.92
Ferris	33,190.82	14,239.64	15,086.29	12,505.17	14,299.89	9,189.05	6,718.36	3,406.73	1,076.32	125,528.12
Four Bear									2,606.00	2,606.00
Grass Creek	697,997.41	835,728.55	552,072.12	871,029.57	444,883.42	345,022.26	287,442.59	267,969.23	245,394.14	7,791,354.99
Lance Creek	265.05									300,008.80
Oregon Basin								32,778.71	34,944.32	67,723.03
Osage	8,353.80	9,019.97	16,659.49	10,839.10	11,261.16	11,645.32	11,724.07	9,817.73	15,695.79	107,759.02
Pine Mountain										7.00
Rock Creek	525,412.62	331,509.44	258,163.95	213,013.68	177,277.51	133,849.11	123,658.30	103,678.07	99,373.06	2,423,845.44
Salt Creek (36-40-79)	1,917,433.88	1,643,336.04	1,960,916.28	2,307,101.43	1,012,444.25	734,040.40	441,670.92	447,805.14	386,731.52	16,652,052.49
Salt Creek (16-40-79)										
(16-39-78)	57,827.05	61,999.86	57,716.62	42,157.37	25,202.61	15,213.46	11,849.49	11,308.21	9,087.08	357,330.61
Warm Springs	14,099.04	9,689.46	2,466.34				1,197.74			122,038.04
Totals	4,246,907.82	3,589,423.22	3,492,475.36	3,492,672.81	2,153,290.52	1,729,991.61	1,388,177.54	1,355,210.83	1,185,319.64	37,782,581.99

Production figures submitted to Commissioner of Public Lands upon which royalty settlements were made.

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FIELD	COUNTY	Production on State Land			Production on Pat'd Land			Production on State Land			Gross Production
		Black Oil	Light Oil	Light Oil	Black Oil	Light Oil	Light Oil	Black Oil	Light Oil	Light Oil	
Alkali Butte	Fremont										7,719.98
Ant Hills	Niobrara										9,350.26
Big Muddy	Nonvase										973,050.27
Black Mountain	Hot Springs										616.00
Bolton Creek	Natrona	432.00									2,693.96
Byron	Big Horn										12,786.88
Cody Structure	Park										1,612.95
Dallas Dome	Fremont										85,662.00
Derby Dome	Fremont										9,373.00
Dutton Creek	Carbon										13,851.46
Elk Basin	Park										355,973.29
Ferris	Carbon										21,296.62
Grass Creek	Park										17,391.95
Greybull	Hot Springs										860,163.31
Hamilton Dome	Big Horn										4,648.17
Hudson	Hot Springs										295,058.78
LaBarge	Lincoln										100,237.13
LaBarge	Lincoln										133,849.78
Lance Creek	Sublette										340,537.04
Lander	Niobrara										172,433.53
Lost Soldier	Fremont										204,260.88
Maverick Springs	Sweetwater										12,260.23
Mule Creek	Fremont										1,416,646.22
Oregon Basin	Niobrara										2,297.78
Osage	Weston										141,340.57
Pilot Butte	Park										835,193.64
Rex Lake	Natrona										126,181.14
Rock Creek	Albany										16,641.88
Salt Creek	Natrona										15,349.12
Shoshone Anticline	Park										8,155.19
Simpson Ridge	Carbon										15,349.12
South Casper Creek	Natrona										17,675.76
South Sunshine	Park										161,273.72
Sunshine	Park										921,844.53
Teapot Dome	Natrona										14,021,959.75
Torchlight	Big Horn										1,398.82
Warm Springs	Hot Springs										32,245.01
TOTALS			33,210.71	1,322,000.12	271,216.29	4,216,887.58	1,441,131.81	14,060,896.53			21,345,343.04

Compiled from Reports to State Board of Equalization.

(169)

OIL PRODUCED IN WYOMING DURING YEAR 1928, BY COUNTIES
(In barrels of 42 U. S. Standard Gallons)

COUNTY	FIELD	Production on State Land		Production on Pat'd Land		Production on Gov't Land		Gross Production
		Black Oil	Light Oil	Black Oil	Light Oil	Black Oil	Light Oil	
Albany	Rex Lake				9,520.57		8,155.19	17,675.76
	Byron				12,786.83			
	Torchlight				4,648.17			
Carbon	Dutton Creek				1,451.95			18,886.95
	Ferris		3,406.73		17,890.19			
	Simpson Ridge		103,678.07		656,892.74		161,273.72	
Converse	Big Muddy		474,161.47		423,844.82		75,043.98	989,237.32
	Fremont						7,719.98	973,050.27
Hot Springs	Dallas Dome				85,662.00			
	Derby Dome				5,520.00		4,158.00	
	Hudson		12,250.23					
Lincoln	Maverick Springs					2,297.78		
	Pilot Butte					84.00		
	Black Mountain	432.00			514,750.25		77,448.88	
Natrona	Grass Creek		267,969.23					
	Warm Springs						295,058.78	
	LaBarge			5,500.00				234,547.00
Niobrara	Poison Creek		459,113.35		2,693.96		15,349.12	
	Poison Spider						313,831.60	
	South Casper Creek						4,400.00	
Park	Ant Hills							14,358,234.43
	Mule Creek		3,853.54		1,612.95		9,350.25	
	Elk Basin							354,951.21
Sublette	Frannie					17,991.95		
	Oregon Basin	32,778.71			24,036.19			
	Shoshone Anticline				1,398.82			
Weston	South Sunshine					1,616.14		1,216,302.23
	Sunshine					3,015.44		2,082,927.23
	LaBarge		9,817.73		1,250,579.25		340,537.04	1,416,846.22
TOTALS	Osage				82,831.44		32,631.97	126,463.41
TOTALS		33,210.71	1,322,000.12	271,216.29	4,216,887.58	1,441,131.81	14,060,896.58	21,345,343.04

Compiled from Reports to State Board of Equalization.

(170)

OIL PRODUCED IN WYOMING DURING YEAR 1928, BY FIELDS
(In barrels of 42 U. S. Standard Gallons)

FIELD	COUNTY	Production on State Land		Production on Pat'd Land		Production on Gov't Land		Gross Production
		Black Oil	Light Oil	Black Oil	Light Oil	Black Oil	Light Oil	
Ant Hills	Niobrara				278,937.92		150,214.40	52.32
Big Muddy	Converse							815,110.73
Black Mountain	Hot Springs	648.50						2,201.50
Black Mountain	Washakie					214.00		19,890.77
Byron	Big Horn				19,890.77			1,096.77
Cody Structure	Park			1,096.77				64,463.00
Dallas Dome	Fremont			64,463.00				10,750.00
Derby Dome	Fremont			5,226.00				11,945.14
Dutton Creek	Carbon							260,555.17
Elk Basin	Park				11,945.14			14,217.48
Ferris	Carbon				13,141.16			2,606.00
Four Bear	Carbon							75,509.32
Frannie	Park				22,823.09			782,708.45
Grass Creek	Hot Springs				1,957.15			3,552.81
Graybull	Big Horn							329,479.30
Harrison	Hot Springs				468,960.19			80,043.42
Hudson	Fremont				3,552.31			
LaBarge	Lincoln							
Lance Creek	Sublette				80,043.42			
Lander	Niobrara							795,525.97
Lost Soldier	Sublette				26,345.02			84,225.66
Oregon Basin	Fremont				14,469.28			14,469.28
Osage	Sweetwater							1,261,515.71
Pilot Butte	Niobrara				1,121,214.25			1,519,391.24
Poison Spider	Carbon				135,434.53			155,217.96
Rex Lake	Niobrara				115,505.12			15,550.05
Rock Creek	Weston				15,550.05			79,563.42
Salt Creek	Fremont							36,124.67
Shoshone Anticline	Natrona				24,746.06			834,270.06
South Casper Creek	Carbon				581,617.88			11,309,487.33
Teapot Dome	Natrona				829,187.97			1,408.86
Torchlight	Park				1,408.86			27,731.08
Warm Springs	Carbon				27,731.08			326,112.21
	Natrona							9,880.00
	Big Horn							2,129.97
	Hot Springs				13,890.56			13,890.56
TOTALS		38,548.82	1,146,770.82	237,650.25	3,902,497.51	2,274,875.86	11,495,766.48	19,096,109.74

Compiled from Reports to State Board of Equalization.

(171)

OIL PRODUCED IN WYOMING DURING YEAR 1929, BY COUNTIES
(In barrels of 42 U. S. Standard Gallons)

COUNTY	FIELD	Production on State Land		Production on Pat'd Land		Production on Gov't Land		Gross Production	
		Black Oil	Light Oil	Black Oil	Light Oil	Black Oil	Light Oil		
Albany	Rex Lake	---	---	24,746.06	---	---	---	86,124.67	
	Byron	---	---	19,890.77	---	---	---	---	
	Greybull	---	---	3,552.31	---	---	---	---	
	Torchlight	---	---	2,129.97	---	---	---	25,573.05	
	Carbon	Dutton Creek	---	---	---	---	---	---	---
		Ferris	---	---	11,945.14	---	---	---	---
		Rock Creek	---	---	13,141.16	---	---	---	---
		Simpson Ridge	---	---	681,617.68	---	---	---	---
		Big Muddy	---	---	27,731.08	---	---	---	---
	Converse	Dallas Dome	---	---	385,958.41	---	---	---	888,163.76
Derby Dome		---	---	---	---	---	---	815,110.73	
Hudson		---	---	---	---	---	---	---	
Lander		---	---	---	---	---	---	---	
Pilot Butte		---	---	---	---	---	---	---	
Hot Springs	Black Mountain	648.50	---	15,550.05	---	---	---	185,275.75	
	Grass Creek	---	---	463,960.19	---	---	---	---	
	Warm Springs	---	---	1,957.15	---	---	---	---	
	Hamilton Dome	---	---	13,890.56	---	---	---	---	
	LaBarge	---	---	---	---	---	---	---	
Lincoln	Poison Spider	---	---	2,589.00	---	---	---	1,128,065.81	
	Salt Creek	---	---	---	---	---	---	346,768.71	
	South Casper Creek	---	---	829,187.67	---	---	---	---	
	Teapot Dome	---	---	---	---	---	---	---	
	Ant Hills	---	---	---	---	---	---	---	
Niobrara	Lance Creek	---	---	---	---	---	---	---	
	Mule Creek	---	---	26,345.02	---	---	---	---	
	Cody Structure	---	---	185,434.58	---	---	---	---	
	Elk Basin	---	---	1,096.77	---	---	---	---	
	Four Bear	---	---	256,800.67	---	---	---	---	
Park	Frannie	---	---	22,823.09	---	---	---	---	
	Oregon Basin	---	---	4,541.54	---	---	---	---	
	Shoshone Anticline	---	---	1,408.36	---	---	---	---	
	LaBarge	---	---	---	---	---	---	---	
	Lost Soldier	---	---	1,121,214.25	---	---	---	---	
Sublette	Black Mountain	---	---	---	---	---	---	---	
	Osage	350.00	---	115,505.12	---	---	---	---	
	---	---	---	---	---	---	---	---	
	---	---	---	---	---	---	---	---	
	---	---	---	---	---	---	---	---	
Sweetwater	---	---	---	---	---	---	---	---	
	---	---	---	---	---	---	---	---	
Washakie	---	---	---	---	---	---	---	---	
	---	---	---	---	---	---	---	---	
Weston	---	---	---	---	---	---	---	---	
	---	---	---	---	---	---	---	---	
TOTALS	---	---	38,548.82	1,145,770.82	237,650.25	3,902,497.51	2,274,375.86	11,495,766.48	19,096,109.74

Compiled from Reports to State Board of Equalization.

(172)

GAS PRODUCED IN WYOMING DURING YEAR 1928, BY FIELDS

FIELD	COUNTY	Production on State Land		Production on Pat'd Land		Production on Gov't Land		Gross Production
		Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	
Baxter Basin	Sweetwater	---	---	303,962,250	---	---	---	452,845,750
Big Muddy	Converse	148,883,500	---	2,419,000	---	---	---	363,518,401
Boone Dome	Natrona	363,518,401	---	663,381,500	---	---	---	2,419,000
Byron	Big Horn	---	---	---	---	---	---	663,381,500
Eight Mile Lake Dome	Carbon	---	---	1,129,649,500	---	---	---	380,145,000
	Elk Basin	---	---	67,031,059	---	---	---	1,130,329,500
Ferris	Carbon	---	---	16,500,000	---	---	---	2,214,286,368
	Hot Springs	---	---	427,726,500	---	---	---	16,500,000
Golden Eagle	Hot Springs	---	---	---	---	---	---	319,770,000
	Hot Springs	---	---	---	---	---	---	427,726,500
Grass Creek	Hot Springs	---	---	140,526,000	---	---	---	3,120,270,500
Hidden Dome	Washakie	151,528,000	---	1,872,056,500	---	---	---	1,511,353,817
Lance Creek	Niobrara	---	---	62,359,812	---	---	---	117,617,000
Little Buffalo Basin	Park	143,259,005	---	---	---	---	---	8,227,258,625
Little Dome	Hot Springs	---	---	---	---	---	---	465,739,489
Mahoney Dome	Carbon	626,573,000	---	424,657,489	---	---	---	906,865,489
Oregon Basin	Park	---	---	725,504,000	---	---	---	18,542,490,000
Rock Creek	Carbon	164,212,000	---	1,386,151,000	---	---	---	4,355,006,250
Salt Creek	Natrona	926,619,000	---	---	---	---	---	3,821,864,000
Sand Draw	Fremont	---	---	---	---	---	---	---
Wertz	Carbon	---	---	---	---	---	---	---
TOTALS	---	2,524,592,906	---	7,221,934,610	---	37,304,861,184	---	47,051,388,700

Compiled from reports to State Board of Equalization.

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GAS PRODUCED IN WYOMING DURING YEAR 1928, BY COUNTIES

COUNTY	FIELD	Production on State Land Cubic Feet	Production on Pat'd Land Cubic Feet	Production on Gov't Land Cubic Feet	Gross Production Cubic Feet
Big Horn	Byron	---	663,381,500	---	663,381,500
	Eight Mile Lake Dome	---	---	380,146,000	---
	Ferris	---	67,031,059	2,147,255,309	---
	Mahoney Dome	626,573,000	---	7,600,685,625	---
	Rock Creek	164,212,000	725,504,000	17,150,000	---
	Wertz	363,518,401	---	3,821,864,000	15,550,420,393
	Big Muddy	---	---	---	363,518,401
	Sand Draw	---	---	---	4,366,006,250
	Golden Eagle	---	16,500,000	---	---
	Hot Springs	151,528,000	140,526,000	27,716,000	453,887,000
Natrona	Little Dome	---	2,419,000	---	---
	Boone Dome	---	---	16,229,710,000	18,544,999,000
	Salt Creek	926,619,000	1,386,161,000	1,248,214,000	3,120,270,500
	Lance Creek	---	1,872,056,500	680,000	---
	Elk Basin	1,129,649,500	---	1,305,735,000	3,108,422,806
Niobrara	Little Buffalo Basin	143,259,005	424,657,489	42,082,000	452,845,750
	Oregon Basin	---	303,962,250	---	427,726,500
	Baxter Basin	148,883,500	---	---	---
	Hidden Dome	---	427,726,500	---	---
Sweetwater	---	---	---	---	---
	Washakie	---	---	---	---
TOTALS	---	2,524,592,996	7,221,934,610	37,304,861,184	47,051,388,700

Compiled from reports to State Board of Equalization.

(174)

GAS PRODUCED IN WYOMING DURING YEAR 1929, BY FIELDS

FIELD	COUNTY	Production on State Land Cubic Feet	Production on Pat'd Land Cubic Feet	Production on Gov't Land Cubic Feet	Gross Production Cubic Feet
Baxter Basin	Sweetwater	166,612,000	544,901,000	---	711,513,000
Bir Muddy	Converse	272,284,250	---	---	272,284,250
Boone Dome	Natrona	---	53,833,000	---	53,833,000
Byron	Big Horn	---	503,286,200	---	503,286,200
Eight Mile Lake Dome	Carbon	---	133,249,000	---	133,249,000
Elk Basin	Park	---	1,442,696,500	---	1,442,696,500
Ferris	Carbon	---	40,700,041	1,555,376,459	1,596,076,500
Golden Eagle	Hot Springs	---	13,750,000	---	13,750,000
Grass Creek	Hot Springs	---	209,947,000	31,707,000	370,424,000
Hidden Dome	Hot Springs	128,770,000	332,452,120	---	332,452,120
Lance Creek	Washakie	---	1,809,156,000	---	3,585,819,000
Little Buffalo Basin	Niobrara	---	143,083,271	2,276,663,000	1,693,678,330
Little Dome	Park	92,948,955	---	1,457,646,104	1,844,203,000
Mahoney Dome	Hot Springs	485,619,000	---	6,266,028,125	6,751,647,125
Muskrat	Carbon	---	---	7,125,000	7,125,000
Oregon Basin	Fremont	---	147,037,500	550,531,665	697,569,165
Rock Creek	Park	81,262,315	599,759,560	66,678,000	697,699,875
Salt Creek	Carbon	849,575,000	1,405,071,000	15,130,412,000	17,384,056,000
Sand Draw	Natrona	---	---	3,168,492,000	3,168,492,000
Wertz	Fremont	---	---	4,144,202,000	4,144,202,000
Carbon	Carbon	---	---	---	---
TOTALS	---	2,077,069,520	6,879,022,192	34,748,068,353	43,704,160,065

Compiled from reports to State Board of Equalization.

(175)

GAS PRODUCED IN WYOMING DURING YEAR 1929, BY COUNTIES

COUNTY	FIELD	Production on State Land		Production on Gov't Land		Gross Production Cubic Feet
		Cubic Feet	Cubic Feet	Cubic Feet	Cubic Feet	
Big Horn	Byron	503,286,200	---	---	---	503,286,200
	Eight Mile Lake Dome	133,249,000	---	---	---	
	Ferris	40,700,041	---	1,555,376,459	---	
	Mahoney Dome	485,619,000	---	6,266,028,125	---	
	Rock Creek	81,262,315	---	16,878,000	---	
Converse	Wertz	---	599,759,560	---	---	13,322,874,500
	Big Muddy	272,284,250	---	4,144,202,000	---	
	Musktrat	---	---	7,125,000	---	
	Sand Draw	---	---	3,168,496,000	---	
	Golden Eagle	13,750,000	---	---	---	
Hot Springs	Grass Creek	128,770,000	---	31,707,000	---	518,377,000
	Little Dome	---	---	134,203,000	---	
	Ewone Dome	849,573,000	---	15,139,412,000	---	
	Salt Creek	1,405,071,000	---	17,447,989,000	---	
	Lance Creek	1,309,156,000	---	3,585,819,000	---	
Niobrara	Elk Basin	1,442,696,500	---	---	---	17,447,989,000
	Little Buffalo Basin	92,948,955	---	1,457,646,104	---	
	Oregon Basin	143,083,271	---	550,531,665	---	
	Exeter Basin	147,037,500	---	---	---	
	Hidden Dome	166,612,000	---	---	---	
Sweetwater	---	---	---	---	---	3,883,943,995
	---	---	---	---	---	
Washakie	---	---	---	---	---	711,513,000
	---	---	---	---	---	
TOTALS	---	2,977,069,520	6,879,022,192	34,748,068,353	---	43,704,160,065

Compiled from reports to State Board of Equalization.

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

S A N D	Black Mountain		Bolton Creek		Dallas-Derby		East Mule Creek		Frannie		Garland		Grass Creek		Hamilton Dome		Hudson (Lander)		Iron Creek		Mahoney Dome	
	Embar Tensleep	Sundance	Embar	Embar	Embar	Embar	Minnchusa	Amsteden	Madison	Tensleep	Madison	Embar	Embar	Embar	Embar	Embar	Embar	Embar	Embar	Embar	Embar	Tensleep
Gravity-A. P. I.	26.2°	22.6°	21.0°	23.3°	26.5°	28.8°	22.0°	22.0°	19.6°	24.7°	23.7°	23.0°	25.7°	33.2°	25.7°	24.0°	23.0°	138°	23.0°	25.7°	33.2°	33.2°
I. E. Point	---	82°	---	---	---	100°	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
B. S. and Water	---	2.5%	---	---	---	Trace	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Sulphur	3.3%	3.0%	2.73%	2.62%	5.0%	2.47%	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Flash	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Fire	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cold Test Four	Zero	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Gasoline and Naptha	19.0%	10.72%	6.5%	11.0%	28.0%	22.0%	7.4%	16.7%	19.6%	24.7%	23.7%	23.0°	25.7°	33.2°	25.7°	24.0°	23.0°	138°	23.0°	25.7°	33.2°	
Kerosene	9.75	11.90	9.0	16.0	19.0	10.2	3.8	3.8	6.0%	16.7%	14.1%	4.4%	4.4%	29.0%	24.0°	23.0°	138°	23.0°	25.7°	33.2°	33.2°	
Distillate	43.50	56.00	25.8	21.2	20.0	6.1	21.5	21.5	2.96%	16.7%	8.5	12.0	12.0	8.5	25.7°	24.0°	23.0°	138°	23.0°	25.7°	33.2°	
Gas Oil	16.25	6.00	13.2	11.1	14.5	8.5	18.5	18.5	---	16.7%	20.1	68.6	68.6	5.4	0.5%	0.5%	3.0%	3.0%	0.5%	0.5%	0.5%	
Bottoms (Fuel Oil)	10.5	36.8	17.2	---	36.8	48.0	48.0	---	---	16.7%	12.3	15.0	15.0	18.0	0.15%	0.15%	110° F.	110° F.	0.15%	0.15%	0.15%	
Asphalt	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Asphalt Distillate	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lab. Oil Distillate	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Wax Distillate	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Tar	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Loss	---	1.60	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 120° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 100° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 90° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 80° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 78° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 60° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Viscosity 50° F.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Date of Analysis	---	May 20, 1926	---	---	Sep. 30 1930	Sep. 1 1928	Oct. 1, 1930	---	---	---	---	---	---	---	---	---	---	---	---	May 21 1926	Mar. 7 1930	---
Analyst	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

* Analyst, U. S. Bureau of Mines.

** Analyst, The Midwest Refining Company.

*** Analyst, Producers & Refiners Corporation.

**** Analyst, Frank E. Taylor, Chief Oil & Gas Inspector.

***** Analyst, Standard Oil Company (Indiana), Casper, Wyoming.

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

	Maverick Springs		Notches		Pitchfork		Poison Spider		Salt Creek		Shoshone Anticline		South Casper Creek		Sunshine (North)		Warm Springs	
	S	A	Embar	Embar	Tensleep	Tensleep	Tensleep	Sun-dance	Tensleep	Tensleep	Embar	Embar	Tensleep	Tensleep	Tensleep	Tensleep	Embar	Embar
Gravity—A. P. I.-----	21.8°		23.0°	17.9°	14.1°	20.7°		14.1°					14.1°					11.8°
L. B. Point-----				2.0 %				0.1 %					0.1 %					
B. S. and Water-----			1.7 %	3.23 %	4.72 %	3.03 %		4.72 %					4.72 %					2.61 %
Sulphur-----																		
Flash-----																		
Fire-----																		
Cold Test Pour-----					25° F.	15° F.		25° F.					25° F.					
Gasoline and Naptha-----	8.6 %		5.38 %	5.2 %	6.4 %	12.9 %		6.4 %					6.4 %					5.4 %
Kerosene-----	14.7		16.93		2.5	3.5		2.5					2.5					11.3
Distillate-----	21.7		51.67		22.5	24.5		22.5					22.5					21.0
Gas Oil-----	10.9			16.5	12.7	17.5		12.7					12.7					7.8
Bottoms (Fuel Oil)-----				77.0									45.0					
Asphalt-----			26.0										22.5					
Asphalt Distillate-----																		
Lub. Oil Distillate-----																		
Wax Distillate-----																		
Tar-----																		
Loss-----					1.3								10.9					
Viscosity 123° F.-----			203		165	325		165										
Viscosity 100° F.-----																		
Viscosity 90° F.-----																		
Viscosity 80° F.-----																		
Viscosity 78° F.-----																		
Viscosity 75° F.-----																		
Viscosity 60° F.-----																		
Viscosity 50° F.-----																		
Universal Saybolt-----																		
Viscosity 70° F.-----																		
Viscosity 100° F.-----																		
Viscosity 150° F.-----																		
Viscosity 210° F.-----																		
Date of Analysis-----				Sep. 9									Mar. 5					
				1930									1926					
Analyst-----			**	***	*	*	*	*	*	*	*	*	*	*	*	*	*	*

* Analyst, U. S. Bureau of Mines.
 ** Analyst, The Midwest Refining Company.
 *** Analyst, Producers & Refiners Corporation.

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

	Byron		Four Bear		Frannie		Garland		Lake Creek		North Casper Creek		Pedro (Osage)		Spindle Top		Spring Creek	
	S	A	Sundance	Tensleep (?)	Tensleep	Madison Tensleep	Madison	Embar	Embar	Tensleep	Tensleep	Sun-dance	Embar Tensleep Amsden	Embar	Embar	Embar	Embar	
Gravity—A. P. I.-----	31.4°		188° F.	202° F.	127° F.	249° F.	115° F.			214° F.	201° F.	210° F.	178° F.					
L. B. Point-----			9.33 %	1.8 %	13.66 %		63.1 %			7.0 %	5.66 %	8.0 %	8.0 %					
B. S. and Water-----			50.9 %	4.0 %	57.0 %		56.41 %			49.7 %	49.7 %	52.5 %	53.0 %					
Sulphur-----			42.8 %	4.0 %	42.8 %		32.3 %			11.33 %	11.33 %	7.16 %	6.8 %					
Flash-----			7.86 %	4.0 %	42.8 %					43.5 %	43.5 %	42.8 %	38.1 %					
Fire-----			29.4		35.4		4.17 %			39.4	39.4	37.8	30.1					
Cold Test Pour-----																		
Universal Saybolt 70° F.-----					104													
Viscosity 100° F.-----																		
Viscosity 130° F.-----																		
Viscosity 150° F.-----																		
Viscosity 210° F.-----																		
DISTILLATION (AIR)																		
First Drop-----																		
5% over-----																		
Up to 392° F.-----																		
Gravity of Cut—A. P. I.-----																		
392° to 482° F.-----																		
482° to 527° F.-----																		
527° to 572° F.-----																		
Residuum-----																		
Base-----																		
VACUUM DISTILLATION																		
At 40 MM:																		
Up to 392° F.-----																		
392° to 482° F.-----																		
482° to 527° F.-----																		
527° to 572° F.-----																		
Residuum-----																		
Base-----																		
Date of Analysis-----			Aug. 8,	Dec. 3,	Sup. 22,	Aug. 2,	Aug. 5,	July 23,	Oct. 29,	Aug. 5,	July 23,	Oct. 7,	Oct. 7,					
			1929	1928	1928	1929	1929	1928	1929	1929	1928	1928	1928					

Analyst, U. S. Geological Survey, Midwest, Wyoming.

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

SAND	Ferris Tensleep	Lost Soldier Bottom of Embar or Top of Tensleep									
Gravity—API		35°									
Color		Black									
B. S and W.		0.2%									
Sulfur		1.19%									
Cold Test		30									
ENGLER DISTILLATION											
I. B. P. 140% @150 2.0% @212 13.0% @300 19.5% @400 31.0											
FRACTIONAL DISTILLATION											
Gasoline	Per Cent	Grav.	Color	IBP	20%	50%	90%	Max	Sul- fur	Corro.	Dr.
	31.1	59.1	30 P	131	200	268	363	413		O.K.	Sweet
Kerosene	Per Cent	Grav.	Color	IBP	Flash	Fire	C. T.	Max.	Sul- fur	Corro.	Dr.
	14.2	38.1	1		165	190	0				
Distillate	9.3	33.1	2		230	255	10				
Gas Oil											
Bottoms	43.5	19.4	Black		350	400	30		1.72%		
Wax Distillate											
Loss	1.9%										
Date of Analysis	June 2, 1930										

SAND	Mahoney Dome Tensleep										
Gravity—API	33.2°										
Color	Black										
B. S and W.	0.3%										
Sulfur	1.13%										
Cold Test	0										
ENGLER DISTILLATION											
I. B. P. 140 % @150 % @212 8.0 % @300 16.0 % @400 29.0											
FRACTIONAL DISTILLATION											
Gasoline	Per Cent	Grav.	Color	IBP	20%	50%	90%	Max	Sul- fur	Corro.	Dr.
	29.0	58.3	30 P	142	229	284	370	417	.015%	Off	Sour
Kerosene	Per Cent	Grav.	Color	IBP	Flash	Fire	C. T.	Max.	Sul- fur	Corro.	Dr.
	8.5	40.4	25 P	380	170	185				18.0%	Off at 410
Distillate	5.4	38.1			190	210					
Gas Oil	12.5	33.0			240	270	20		.070%		
Bottoms	18.0	12.5	Black		525	610	74		2.74%	Too pitchy to get visc. @210	
Wax Distillate	24.5	25.7			330	375	66		0.97%	106 @100	
Loss	2.1%										
Date of Analysis	March 7, 1930										
Analyst, Producers & Refiners Corporation, Parco, Wyoming.											

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

	Oregon Basin Embar Sand			Byron Tensleep Sand			
Gravity	20.8°			24.2°			
Cold Test	0						
Sulphur	3.362%			2.22%			
B. S. W.	0.2%			0.3 %			
	Gasoline	Distill- ate	Fuel Oil	Gasoline	Kerosene	Gas Oil	Fuel Oil
Percent	16.20	8.60	74.40	14.9	3.72	12.7	
Gravity	56.2°	37.3°	12.6°	53.0°	39.2°	32.5°	16.3°
Sulphur	0.192	1.090	3.950	.028			
Color	28	20					
Cold Test			40				30°
I. B. P.	119	375		128			
10%	180	423		204			
20%	206	432		244			
30%	230	440		274			
40%	252	447		298			
50%	273	455		318			
60%	293	463		338			
70%	314	473		358			
80%	338	486		378			
90%	366	507		402			
95%				422			
E. P.	423	546		442			
Recovery	99%	98%		98%			
Loss	1%	2%		2%			
Flash			335				375
Fire			385				440
Viscosity			395 Furol @ 122°F.				112°F.-118 Seconds

DISTILLATION WITH GRAVITIES
Method: Hempel
Charge—2000 c. c. Gravity 20.8°
Date of Analysis, July 25, 1930.
Analyst, Laurel Oil & Refining Com-
pany, Laurel, Montana.

% over I. B. P.	Temper- ature	Gravity	
I. B. P.	98		
2½	180	80.9	
5	230	67.7	
7½	264	59.9	
10	304	54.0	
12½	350	49.4	
15	382	45.2	
16.2	400	42.8	End Gaso.
20	454	40.0	ist Dist.
22½	482	36.5	
24.8	500	35.2	End. Dist.

Date of Analysis, July 19, 1928.
Analyst, White Eagle Oil & Refining Co.,
Casper, Wyoming.
Sample from State section 16-51-100.

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ANALYSES OF CRUDE FROM BLACK OIL FIELDS

Pitchfork Tensleep Sand		Simpson Ridge	
TOPPING DISTILLATION			
Gravity—A. P. I.	18.5°	21.5° to 33.0° A. P. I.	
Topped	3.40%	B. S. and Water	0.22%
Water	3.38%		0.3 %
Residuum	77.79%	Gravity	44.0° A. P. I.
Loss	.43%	Initial	142° F.
Total	100.00%	End Point	423° F.
REDISTILLATION OF TOPS			
Cut	Per cent of Cut	Temperature °C.	Specific Gravity of Cut
1	2	98	78.8
2	2	133	60.9
3	2	158	52.8
4	2	188	48.5
5	2	209	44.5
6	2	227	41.6
7	2	249	38.9
8	2	273	35.7
On Basis of Original Charge: Redistilled Bottoms (Gr. 29.9 A. P. I.)			
			15.00%
			8.19%
			3.30%
			19.49%
REDISTILLATION OF GASOLINE			
Cuts Grav. I.B.P. E.P.	10% 20% 30% 40% 50% 60% 70% 80% 90%	Rec.	
1-4	59.0 50 204 83 100 114 126 135 148 156 162 173 183 185		
1-4	58.1 51 215 87 104 117 129 138 147 159 169 185 186 188		
SUMMARY: 8.50% Gasoline—End Point 420° F.—Gravity 53.1°			
	8.25% Kerosene—Gravity 39.0°		
	80.14% Fuel Oil—Viscosity 358 Sec. Furol @ 122° F.		
	2.38% Water		
	.73% Loss		
	100.00		

Light Lubricating Distillate 26.0° A. P. I.
 Gravity 26.0° F.
 Flash 282° F.
 Fire 282° F.
 Viscosity 55" @ 100° F.
 Cold Test below 0° F.

Heavy Lubricating Distillate 20.7° A. P. I.
 Gravity 320° F.
 Flash 380° F.
 Fire 270" @ 100° F.
 Viscosity 0
 Cold Test 468° F.
 Fire 550° F.

Bottoms (Fuel Oil)
 Flash 26.0 %
 Fire 0.7 %
 Loss

Date of Analysis not shown.
 Analyst, Producers & Refiners Corporation, Parco, Wyoming.

Centrifuge Cut: 2.4% (Mostly water, small amount of sediment)
 Date of Analysis, July 20, 1930.
 Analyst, Honolulu Consolidated Oil Company, Taft, California.

ANALYSES OF CRUDE FROM LIGHT OIL FIELDS

FIELD	SAND	A. P. I. Gravity	Per cent Gasoline and Naptha	Kerosene	Per cent Gas Oil	Lubricants	Per cent Residuum	Per cent Sulphur	Per cent Water	Per cent Carbon
Alkali Butte	Wall Creeks	15.1	24.4	8.2	12.7	20.6	6.0	0.25	0	5.05
Big Muddy	Shannon	33.6	23.1	9.8	18.0	17.8	0.4	0.26	0	5.00
Byron	Muddy Frontier	44.5	61.5	5.1	20.0	18.0		0.18	0	4.2
Dry Piney	Muddy	39.3	40.5	17.4	10.6	14.6	5.3	0.14	0	5.3
Dutton Creek	Torchlight (Tier)	44.5	61.5	5.1	20.0	18.0	0.4	0.18	0	4.2
Elk Basin	Ben-in-Mowry	36.3	31.1	13.4	10.8	17.7	5.5	0.19	0	5.5
Ferris—G. P. Dome	Muddy	43.1	42.6	20.0	9.9	18.8	4.6	0.14	0	3.7
Grass Creek	Dakota	44.3	38.6	17.8	11.0	15.6	2.3	0.08	0	2.3
Greybull	Tertiary Sands	21.3	3.9	0	28.7	35.2	30.9	0.15	Trace	
La Barge	Muddy	43.6	33.9	9.5	17.7	17.8	2.0	0.065	0	1.0
Lance Creek	Wall Creeks	30.0	16.7	18.5	18.6	22.4	6.5	0.11	0	6.5
Lest Soldier	Dakota-Lakota	See analysis under Blk. Oil Flds.								
Mahoney Dome	Tensleep	31.5	11.7	17.4	13.1	22.0	4.8	0.14	0	4.8
Mule Creek	Lakota	37.3	34.8	15.8	9.8	15.6	5.2	0.29	0	5.2
Osage	Muddy	35.1	24.0	19.7	13.2	18.7		0.22	0	3.5
Pilot Butte	Phase of Pierre									
Rex Lake	Muddy-Dakota-Lakota									
Rock Creek	Lakota	36.0	31.1	15.0	10.0	15.8	6.8	0.27	0	6.8
Salt Creek	Dakota	31.4	31.4	14.2	10.0	15.7	6.8	0.27	0	6.1
	1st Wall Creek	36.5	29.3	16.7	10.8	16.7	6.1	0.18	0	6.1
	2nd Wall Creek	36.5	29.3	15.7	10.8	16.9	6.1	0.18	0	4.2
	3rd Wall Creek	35.6	29.3	4.7	19.5	19.9		0.16	Trace	8.4
	Lakota	33.2	28.4	4.1	20.5	17.7		0.24	Trace	
	Morrison	33.1							0	5.1
Shannon	Shannon	24.0	3.1	11.1	4.9	36.5	20.1	0.20	0	6.02
Spring Valley	Aspen Shale	39.4	34.1	16.5	9.3	17.6		0.16	0	4.03
Teapot Dome	Shale	43.2	39.5	17.3	10.6	16.1		0.12	0	6.24
	2nd Wall Creek	35.2	28.0	14.9	11.1	15.3		0.20	0	
	Shale	38.6	29.3	11.2	6.5			0.09	Trace	
Teapot (Outside)										

ANALYSES OF CRUDE FROM LIGHT OIL FIELDS—(Continued)

FIELD	SAND	A. P. I Gravity	Per cent Gasoline and Naptha	Per cent Kerosene	Per Cent Gas Oil	Per cent Lubricants	Per cent Residuum	Per cent Subpur	Per cent Water	Per cent Carbon
Torchlight Upton-Thornon West Mule Creek	Frontier	46.0	44.2	18.1	13.9	12.8	8.4	0.14		

Where the percentage of Residuum is shown, the difference between the total of the percentages shown and 100 per cent represents the amount of tars, fuel oil and asphaltum in each field.

Under column headed "Percent Carbon" is indicated the percentage of "Carbon Residue of Residuum."

POSTED FIELD PRICES FOR CRUDE OIL IN FIELDS SHOWN, WITH DATES EFFECTIVE

	1925 Aug. 1	1925 Aug. 28	1925 Sept. 10	1926 Feb. 2	1926 May 17	1926 Nov. 17	1927 Feb. 23	1927 Mar. 7	1927 Mar. 12	1928 Feb. 21	1928 Jul. 26	1929 Jan. 25	1929 May 20	1930 Feb. 10	1930 Feb. 11	1930 Feb. 15	1930 Apr. 10	1930 May 1	1930 Oct. 15	1930 Oct. 27	1930 Oct. 28	1930 Nov. 1
Salt Creek																						
*(Mid-Continent)																						
28-29.9 Gravity	\$1.48	\$1.23	\$	\$1.48	\$1.73	\$1.55	\$1.39	\$1.26	\$1.14	\$1.01	\$.95	\$.90	\$1.10	\$1.00	\$	\$.90	\$1.00	\$	\$	\$.69	\$	\$
30-30.9 Gravity	1.56	1.31		1.56	1.81	1.60	1.43	1.29	1.16	1.06	1.02	1.02	1.15	1.05		1.02	1.05			.73		
31-31.9 Gravity	1.64	1.39		1.64	1.89	1.65	1.47	1.32	1.18	1.11	1.09	1.02	1.20	1.10		1.02	1.10			.77		
32-32.9 Gravity	1.72	1.47		1.72	1.97	1.70	1.51	1.35	1.20	1.16	1.16	1.08	1.25	1.15		1.08	1.15			.81		
33-33.9 Gravity	1.80	1.55		1.80	2.05	1.75	1.55	1.38	1.22	1.19	1.21	1.11	1.30	1.185		1.11	1.185			.85		
34-34.9 Gravity	1.88	1.63		1.88	2.13	1.80	1.59	1.41	1.24	1.22	1.26	1.14	1.35	1.22		1.14	1.22			.89		
35-35.9 Gravity	1.96	1.71		1.96	2.21	1.85	1.63	1.44	1.26	1.25	1.31	1.17	1.40	1.255		1.17	1.255			.92		
36-36.9 Gravity	2.04	1.79		2.04	2.29	1.90	1.67	1.47	1.28	1.28	1.36	1.20	1.45	1.29		1.20	1.29			.96		
37 and above	2.12	1.87		2.12	2.37	1.95	1.71	1.50	1.30	1.31	1.41	1.23	1.50	1.325		1.23	1.325			.98		
*Alkali Butte																						
Big Muddy	2.00	1.75		2.00	2.25	1.85	1.62	1.42	1.25		1.33	1.28	1.43			1.33	1.38				1.00	
Dutton Creek																						
Elk Basin	2.15	1.90		2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.35	1.35				1.01	
Ferris-G. P. Dome	1.60		1.70	1.85	2.20	1.80	1.60									1.55	1.55				1.25	
Four Bear																						
*Frannie																						
Grass Creek—Light	2.15	1.90		2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
—Heavy	2.00			2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
Greyhall-Torchlight	2.00			2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
Hamilton Dome	1.60	1.55		1.85	2.20	1.85	1.60	1.40	1.25		1.48	1.36	1.65			1.55	1.55				1.25	
Hudson (Lander)	.85			1.35	1.70	1.35	1.10	1.00	.85													
La Barge	2.15	1.90		2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
—Heavy	2.00			2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
—Light	1.60	1.55		1.85	2.20	1.85	1.60	1.40	1.25		1.48	1.36	1.65			1.55	1.55				1.25	
Lance Creek	2.15	1.90		2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
Loft Soldier	1.35			1.35	1.60	1.35	1.15	1.05	.95													
Mule Creek	1.50	1.25		1.50	1.75	1.45	1.30	1.10	.95													
Norches					.65																	
Oregon Basin	2.15	1.90		2.15	2.40	2.00	1.75	1.55	1.33		1.48	1.36	1.65			1.45	1.55				1.25	
Osage																						
Poison Spider																						
Box Lake	1.20			2.00	2.25	1.85	1.60	1.42	1.25		1.33	1.18	1.40			1.25	1.35				1.01	
Shick Creek	2.00	1.75		2.00	2.25	1.85	1.62	1.42	1.25		1.33	1.18	1.40			1.25	1.35				1.01	
Simpson Ridge																						
South Casper Creek	.80				1.00		.70															
West Mule Creek										1.25												

*Gravity basis effective in Wyoming Aug. 1, 1925, first time.
 †Basis for royalty settlements with Government.
 ‡Not posted, but established by U. S. G. S. for Government royalty oil.
 §Per barrel above posted price for Mule Creek oil, established by U. S. G. S. and adopted by State of Wyoming.

STATISTICAL REVIEW BLACK OIL FIELDS IN WYOMING

(From data available to September 1, 1930)

Field	Production Formation	A. P. I. Gravity	Number Producing Wells	Estimated Daily Production of Completed Wells	Proven Productive Acreage				Estimated Recoverable Oil in Barrels	Present Pipe Line Facilities
					State	Patented	Government	Total		
Black Mountain	Embar	27.2	4	600	---	---	---	---	---	None
	Tensleep (?)	22.9	4	100	---	---	---	---	---	6"
Bolton Creek	Sundance	26.9	4	600	---	---	---	---	---	None
Byron	Tensleep	24.2	1	500	---	---	---	---	---	6"
Dallas	Embar	22.0	26	200	---	---	---	---	---	4"
	Tensleep	23.0	1	200	---	---	---	---	---	8"
Derby	Embar	22.0	16	200	---	---	---	---	---	None
*Ferris	Tensleep	---	1	350	420	80	---	8,500,000	---	None
Four Bear	Tensleep (?)	11.5	1	100	---	---	---	---	---	3"
Frannie	Madison	17.7	1	800	---	80	400	2,985,600	---	None
	Tensleep	29.0	3	1,500	---	---	---	---	---	6"
Garland	Madison	19.6	1	6,000	240	920	2,380	329,282,000	---	None
Grass Creek	Embar	25.0	11	1,800	---	---	1,220	64,880,820	---	6"
	Tensleep	23.0	27	200	---	---	---	---	---	At Railroad
Hamilton Dome	Embar	21.5	1	700	---	---	---	---	---	None
	Tensleep	23.0	22	100	---	---	---	---	---	None
Hudson (Lander)	Embar	23.0	5	25	---	---	---	---	---	8"
	Tensleep	25.7	1	---	---	---	---	---	---	None
Iron Creek	Embar	35.0	1	---	---	---	---	---	---	None
Lake Creek	Tensleep	33.2	1	8,500	---	---	---	---	---	6"
*Lest Soldier	Embar	22.0	31	150	---	---	---	---	---	None
*Mahoney Dome	Tensleep	22.0	31	300	---	---	---	---	---	3"
Maverick Springs	Embar	26.5	1	75	---	---	---	---	---	2"
Mule Creek (East)	Minnelusa	20.3	3	10,125	160	---	7,470	301,992,100	---	At Railroad
Notches	Amsden (?)	---	8	---	---	---	---	---	---	8"
North Casper Creek	Tensleep	23.0	3	---	---	---	---	---	---	At Railroad
Oregon Basin	Embar	20.3	3	---	---	---	---	---	---	8"
	Tensleep	22.5	29	---	---	---	---	---	---	---

STATISTICAL REVIEW BLACK OIL FIELDS IN WYOMING—(Continued)

(From data available to September 1, 1930)

Field	Production Formation	A. P. I. Gravity	Number Producing Wells	Estimated Daily Production of Completed Wells	Proven Productive Acreage			Estimated Recoverable Oil in Barrels	Present Pipe Line Facilities
					State	Patented	Government		
					Total				
Pedro (Osage Field)	Tensleep	29.3	2	25	200	---	40	240	Building
*Pitchfork	Sundance	17.5	1	200	---	---	---	---	None
Poison Spider	Tensleep	22.0	13	300	---	---	---	---	None
Salt Creek	Embar	27.7	1	1,800	---	---	---	---	Several
Shoshone Anticline	Embar	---	2	150	---	---	---	---	None
South Casper Creek	Tensleep	14.1	22	1,000	30	---	290	420	None
South Sunshine	Embar	19.9	1	380	---	---	---	---	None
Spindletop	Sundance	21.6	3	75	80	---	1,800	2,000	None
Spring Creek	Tensleep	15.5	1	180	---	---	40	200	None
Sunshine (North)	Tensleep	19.0	1	30	---	---	---	---	None
Warm Springs	Embar	20.0	29	125	---	---	---	---	4

*Mixed Base, containing definite percentage of paraffin.

THE FOLLOWING STRUCTURES HAVE DEEP BLACK OIL POSSIBILITIES:

BIG HORN BASIN
 Coal Draw (Deep test rig on ground)
 Elk Basin (Deep test now drilling)
 Enclosed Creek (Test contemplated in 1931)
 Goshute
 Little Buffalo Basin
 Little Dome
 Wagonhound (Deep test now drilling)
 Walker Dome

POWDER RIVER BASIN
 Big Muddy (Test Drilling)
 Lance Creek (Test drilling; reported discovery of heavy oil in Sundance sand)
 Middle Creek (Immediate test contemplated)
 West Mule Creek

WIND RIVER BASIN
 Oil Mountain Sand Draw

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SALT CREEK FIELD

(In barrels of 42 U. S. Standard Gallons)

Comparison of Gross Production of Crude Oil from State Owned Lands with Gross Production of Entire Field, Based on Pipe Line Runs.

Year	Section 36, Township 40, Range 70			Section 16, T. 40, R. 79, T. 39, R. 78			All State Owned Lands		
	Gross Production	Frontier Sands and Shale	Lakota Sand	Gross Production	Percent of Gross Field Production	Frontier Sands and Shale	Percent of Gross Field Production	Gross Production	Per Cent of Gross Field Production
1911	51,798.00	973.00		973.00	1.88			973.00	1.88
1912	1,457,899.00	438,304.00		438,304.00	37.85			438,304.00	37.85
1913	2,274,465.00	511,933.00		511,933.00	22.70			511,933.00	22.70
1914	3,279,329.00	483,638.00		483,638.00	14.31	2,694.00	0.08	486,332.00	14.39
1915	3,686,328.00	497,368.00		497,368.00	12.64	3,682.50	0.09	501,000.50	12.73
1916	3,400,433.00	435,724.00		435,724.00	10.89	2,245.00	0.06	437,969.00	10.96
1917	3,512,992.61	647,845.00		647,845.00	16.87	1,576.00	0.04	649,421.00	16.91
1918	6,205,716.11	781,611.61		781,611.61	14.18	2,061.97	0.04	783,673.58	14.22
1919	12,255,410.31	654,062.80		654,062.80	10.53	12,778.50	0.21	666,841.39	10.74
1920	19,578,888.76	1,348,413.13		1,348,413.13	13.15	40,880.89	0.40	1,389,294.02	13.55
1921	35,561,116.65	1,917,483.88		1,917,483.88	15.49	57,827.05	0.47	1,975,310.93	15.96
1922	30,801,703.23	1,649,936.04		1,649,936.04	8.53	61,098.86	0.32	1,705,035.90	8.85
1923	25,531,980.00	1,060,916.28		1,060,916.28	5.56	57,176.62	0.16	2,018,632.90	5.72
1924	17,978,320.16	2,307,101.43		2,307,101.43	7.48	42,157.87	0.14	2,349,258.80	7.62
1925	14,353,123.63	1,012,444.25	6,980.00	1,012,444.25	3.97	25,202.61	0.09	1,037,646.86	4.06
1926	14,041,039.95	731,093.51	2,946.80	731,093.51	4.08	15,213.46	0.08	749,253.86	4.16
1927	11,812,094.09	422,810.27	18,860.65	422,810.27	3.19	11,849.49	0.08	453,520.41	3.16
1928	5,863,996.18	437,745.93	10,059.21	437,745.93	3.42	11,308.21	0.08	459,113.35	3.27
1929	11,812,094.09	386,548.99	232.53	386,548.99	3.35	9,087.08	0.08	395,636.60	3.50
1930	5,863,996.18	185,778.94		185,778.94	3.35	4,034.33	0.07	189,813.27	3.43
Jan. to June		Compared with same period in 1929							
Tots.	226,352,019.36	16,798,725.15	39,079.28	16,837,831.43	7.42	361,364.94	0.16	17,199,196.37	7.58

*Repressuring operations started

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SALT CREEK FIELD

(In barrels of 42 U. S. Standard Gallons)

Comparison of Gross Production of Crude Oil from State Owned Lands with Gross Production of Entire Field, with Increase or Decrease over Previous Year.

Year	SALT CREEK FIELD				STATE OWNED LANDS					
	Gross Production	Increase in Production		Decrease in Production		Gross Production	Increase in Production		Decrease in Production	
		Barrels	Percent	Barrels	Percent		Barrels	Percent	Barrels	Percent
1911	51,798.00	---	---	---	---	973.00	---	---	---	---
1912	1,157,899.00	---	---	---	---	438,504.00	---	---	---	---
1913	2,254,946.00	1,097,047.00	94.74	---	---	511,933.00	16.80	---	---	---
1914	3,379,329.00	1,124,383.00	49.56	---	---	486,332.00	---	25,601.00	5.00	---
1915	3,936,328.00	556,999.00	16.48	---	---	591,000.50	3.02	14,668.50	---	---
1916	4,000,453.00	64,105.00	1.63	---	---	437,399.00	---	63,031.50	12.58	---
1917	5,840,502.00	1,872,490.61	43.55	159,391.00	4.00	649,421.99	43.28	211,452.00	---	---
1918	5,812,992.51	6,295,716.14	107.88	---	---	783,673.38	20.67	134,252.58	---	---
1919	6,295,716.14	6,995,723.53	111.28	---	---	666,541.39	---	116,832.19	14.91	---
1920	10,255,410.31	4,046,694.17	65.18	---	---	1,389,294.02	108.34	722,452.63	---	---
1921	12,378,688.76	2,123,278.45	20.70	---	---	1,975,510.93	42.18	586,016.91	---	---
1922	19,261,116.53	6,882,427.87	55.60	---	---	2,018,632.90	18.39	---	---	---
1923	35,301,607.58	16,040,490.95	85.28	---	---	2,349,258.80	16.38	330,625.90	---	---
1924	30,831,703.32	---	---	4,469,904.26	12.66	1,037,646.86	---	---	---	---
1925	25,531,980.00	---	---	5,299,723.32	17.19	1,037,646.86	---	---	---	---
1926	17,978,320.16	---	---	7,553,659.84	29.59	749,253.86	---	---	---	---
1927	14,353,128.63	---	---	3,625,191.53	20.16	458,520.41	---	---	---	---
1928	14,041,023.95	---	---	312,098.68	2.17	459,113.35	---	5,592.94	1.23	---
1929	11,312,094.09	---	---	2,728,935.86	19.44	395,868.69	---	---	---	---
1930	5,363,996.18	---	---	176,500.14	3.19	189,813.27	---	---	---	---
Jan. to June	---	---	---	Compared with same period in 1929	---	---	---	Compared with same period in 1929	---	---
Totals	226,952,019.36	---	---	---	---	17,199,196.37	---	---	---	---

*Repressuring operations started

(1907)

CORRELATION TABLE SHOWING THE GEOLOGICAL FORMATIONS IN THE OIL PRODUCING AREAS OF WYOMING

ERA	EPOCH	Southwestern Wyoming	Wind River Basin	Big Horn Basin	Shoshone River Basin	FORMATIONS Central Wyoming	Rawlins Area	Laramie Basin	Eastern Wyoming	Northeastern Wyoming	Southeastern Wyoming	
Tertiary	Wasatch	Bridger Green River	Wind River	Wasatch	Wasatch	White River	Wasatch	Undifferentiated	White River		Ogallala Arikaree Brule Clay Chadron	
		Knight Fowkes Almy				Wind River						
		Evanston		Fort Union	Fort Union	Fort Union	Fort Union			Fort Union		
		Laramie		Ilo (Lance)	Ilo (Lance)	Lance	Laramie	Lewis	Lance	Lance		
Tertiary or Cretaceous	Montana	Adaville	Mesaverde	Mesaverde (Eagle Sand)	Gebo (Engle)	Mesaverde (Teapot sand) Parkman sand)	Mesaverde	Mesaverde	Fox Hills	Fox Hills	Fox Hills	
		Hilliard (Blair) (Baxter Shale)		Pierre		Steele (Shannon sand)	Pierre	Steele				
		Frontier	Mancos	Basin (Niobrara)	Cody	Niobrara	Niobrara	Niobrara	Niobrara	Pierre	Pierre	Pierre
		Aspen		Frontier (Torchlight-Peay Sands)	Frontier (Sands)	Frontier (Wall Creek sands)	Frontier (Wall Creek sands)	Carlie	Benton (Frontier sands)	Carlie	Carlie	Niobrara
Cretaceous	Colorado			Mowry (Kimball Sand) (Orth Louie sand)	Mowry	Mowry	Mowry (Shale and sand)	Mowry (Frontier shale)	Grangerous (Mowry shale)	Grangerous (Mowry shale)	Benton (Mowry shale)	
				Thermopolis (Sand)	Thermopolis (Sand)	Thermopolis (Sand)	(Muddy sand)	(Muddy sand)	(Newcastle sand)	(Newcastle sand)		
		Bear River	Dakota (Sand) (Shale and Sand)	Cloverly (Greybull sands)	Cloverly (Greybull sand)	Dakota (Sands)	Dakota (Sands)	Cloverly (Sands)	Dakota Fuson Lakota	Dakota Fuson Lakota	Dakota Fuson Lakota	Cloverly
		Beekwith	Morrison	Morrison (Sand)	Morrison (Byron sand)	Morrison	Morrison	Morrison	Morrison	Morrison	Morrison	Morrison
Jurassic	Cretaceous ? Jurassic ?	Twin Creek Nugget	Sundance	Sundance	Sundance	Sundance	Sundance	Missing	Sundance	Sundance	Sundance	
		Ankareh Haynes Woodside	Chugwater	Chugwater	Chugwater	Chugwater	Chugwater	Chugwater	Spearfish	Spearfish	Chugwater	
Permian (Carboniferous)	Pennsylvanian (Carboniferous)	Park City	Embar (Sand)	Embar (Sand)	Embar	Embar (Sand)			Minnekahta Opeche	Minnekahta Opeche	Minnekahta Opeche	
		Weber		Tensleep Annsden	Tensleep Annsden	Tensleep Annsden	Casper	Forelle Santanka Casper	Hartville	Hartville	Casper	
Mississippian (Carboniferous)				Madison	Madison	Madison			Guernsey	Pahasapa	Pahasapa	

TABULATION OF OIL STRUCTURES IN WYOMING

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Agate Basin	(See Mule Creek)					
Alcova Dome	Natrona				Carlile shale	Dry hole drilled to granite
Armino Dome	Natrona	2,800	All below Dakota		Pierre shale	Some gas in 3rd Wall Crk.
Alkali Butte	Fremont		All below Dakota		Mesa Verde	Oil found in Muddy shale
Alkali Creek	(See Hiawatha)					
Alkali Dome	Big Horn		No deep test		Niobrara shale	
Allen Lake	(See Eight Mile Lake)					
Altamont	(See Spring Valley)					
Ant Hills	Niobrara	4,000	All below Sundance	1,200 a.	Pierre shale	Oil found in Muddy sand
Antelope Gap	Platte		All sands		White River	No test made
Arch Creek	Crook		Sundance and lower		Dakota	No test made
Aspen	(See Spring Valley)					
Arvada			All sands		Lower Tertiary	No test made, but enough gas flows through faults to run engine on C. P. & Q. R. R. pumping station
Badger Basin	Park	4,800	All sands	12 sq. miles	Fort Union	Test started in 1928
Baggs	Carbon	4,500?	All sands		Lower Tertiary	Test started 1928
Bailey Dome	Carbon				Steele shale	No test
Bates Creek	Natrona		All below Sundance		Dakota	No test
Bates Hole (Schnoor)	Natrona	2,000		3 sections	Morrison	Tested to Tensleep and abandoned

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Bates Park	Natrona		Amsden and below	4 sections	Dakota	Tested to Tensleep and abandoned
Baxter Basin	Sweetwater	4,000	All below Lakota	Very large	Hilliard and older shales	Gas production in Frontier sands
Bear Creek	Sweetwater		All sands		Green River form	No test drilled
Bear Dome	(See Crystal Creek)					
Beaver Valley	Weston		All below Dakota		Pierre shale	No test drilled
Belle Springs	Carbon	4,000	Sundance and below		Mesa Verde	Gas production in Frontier sands
Berry Dome	Hot Springs		All sands		Mesa Verde	No test drilled
Bessemer Bend (Goose Egg)	Natrona		Below Embar		Morrison	One dry hole drilled
Big Dome	(See Maverick Springs)					
Big Hollow	Albany	4,000	Amsden and Madison		Benton shale	Deep test dry and abandoned. Black oil at shallow depth
Big Muddy	Converse	4,500	All below Lakota	7 sections	Pierre shale	Oil production in Cretaceous sands
Big Piney	(See Dry Piney)					Two dry holes
Big Sand Draw	Fremont	3,500	All below Frontier	5 sections	Mesa Verde	Gas production in Frontier sands
Big Sulphur Springs (Wilson Dome)	Natrona		All sands		Niobrara	Not tested
Billy Creek	Johnson	4,500	All below Lakota	5 sections	Pierre shale	Gas production in Muddy sand

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Black Dome	(See Spence Dome)					
Black Mountain	Hot Springs	3,200	Amsden and Madison	3 sections	Morrison	Black oil in Embar and Tensleep
Black Tail	Fremont		All sands		Morrison	Not tested
Blue Spring	Hot Springs (See Kirby Creek)					
Bodie Dome (Freeland)	Natrona		All sands		Dakota	Not tested
Bolton Creek	Natrona	3,000	Amsden and Madison	2 sections	Frontier	Black oil in Sundance and Embar
Bonanza Dome	Big Horn		Amsden and Madison		Frontier	
Boone Dome	Natrona	4,500	Dakota and below	1 section	Pierre	Gas in first Wall Creek
Bothwell Dome	Albany		All sands		Cloverly	Not tested
Brenning Basin	Converse	400	Embar and below	2 sections	White River	Light oil at shallow depth, small wells
Bridger Dome	Unita				Bear River	Not tested
Brooks Dome	Hot Springs				Cody shale	Not tested
Bruce Dome	(See Black Mountain)					
Buck Springs	Fremont				Fort Union	Not tested
Bud Kimbal	Washakie				Cloverly	Not tested
Lt. Buffalo Basin	Park	2,800	Dakota and below	8 sections	Cody shale	Gas in Frontier

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Buffalo Basin (Oil Springs)	Fremont	2,000	Dakota and below		Steele shale	Gas in Frontier (not commercial)
Bull Creek	Crook				Carlisle shale	Not tested
Bunker Hill	Carbon		Dakota and below		Mesa Verde	Tested in upper sands
Burriss Dome	Johnson		Dakota and below		Mesa Verde	One dry hole
Burling Dome	Fremont				Morrison	Not tested
Butte Monocline	Crook (See Moorcroft Field)					
Byron Field	Big Horn	400 & 2,800	Sundance and below	4 sections	Niobrara shale	Light oil, shallow sand and black oil and gas in Ten-sleep and Amsden sands
Canyon Creek Dome	(See Hiawatha)					
Carehurst Dome (Horseshoe)	Converse		Frontier and below		Pierre shale	One dry hole
Carroll Ranch	Natrona		Sundance and below		Steele shale	One dry hole
Carter Dome	Uinta (Also see Greybeal)				Bear River	One dry hole
Casper Dome	Natrona		All sands		Pierre shale	Several shallow dry holes one deep dry hole
Castle Creek	Natrona		Dakota and below		Pierre shale	One dry hole
Cedar Ridge	Carbon				Mesa Verde	Untested
Centennial Valley Dome	Albany				Dakota	Untested
Chabot Dome	Washakie				Morrison	Untested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Chalk Cliffs	(See McGill Dome)					
Cherry Dome	Big Horn				Niobrara	Untested
Cherokee Ridge	Sweetwater				Green River	Untested
Cherokee River	(See Mule Creek)					
Chicago Creek	Crook				Carlisle shale	Untested
Chudd Dome	Fremont				Wind River	One dry hole
Circle Ridge	Fremont (See Maverick Springs)					
Clarke Dome	Natrona				Pierre shale	Untested
Coal or Cole Creek Dome	Converse		Sundance and below		Mesa Verde	One deep dry hole
Cocanut Creek	Fremont				Penton shale	Untested
Cody Dome	(See Shoshone Dome)					
Colony Dome	Crook				Carlisle shale	One deep dry hole
Colter Dome	Washakie				Wasatch	Untested
Como Ridge	Albany				Benton shale	Untested
Conant Creek	Fremont				Steele shale	Untested
Cooper Cove	Carbon				Mesa Verde	One dry hole
Corley Dome	Hot Springs				Pennsylvanian	Untested
Cottonwood	(See Hamilton Dome)					
Cottonwood Creek	Natrona				Benton	Untested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Cow Gulch	Niobrara				Morrison	Black oil showings in some early wells
Crazy Woman	Johnson		Sundance and below		Mesa Verde	One dry hole
Cowley Dome	Big Horn				Mesa Verde	One dry hole
Crooks Gap (Spring Creek)	Fremont	2,000	Muddy and below		Steele shale	Showings of light oil in Frontier
Crooked Creek	Big Horn				Morrison	Untested
Crooked Stick	Converse				Chugwater	Untested
Crystal Creek	Big Horn	700	Tensleep and below		Morrison	Black oil production in Sundance
Cumberland	Lincoln and Uinta		Dakota and below		Aspen shales	One dry hole
Dad Monocline	Carbon		All sands		Wasatch	Untested
Dallas Dome	Fremont	900	Amsden and Madison	1 section	Morrison	Black oil production
Danker Dome	Park	2,000	Dakota and below	3 sections	Mesa Verde	Gas production in Frontier
Davidson Dome	Lincoln				Wasatch	Untested
Dead Horse	Natrona				Niobrara	Untested
Derby Dome	Fremont	900	Amsden and Madison	3 sections	Morrison	Black oil production
Dewey Dome	Weston				Pierre shale	Untested
Diamond Pointe (See Cooper Cove)	Albany					
Diamond Basin	Park				Cody shale	Untested, now drilling

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Douglas Monocline	Converse				White River	One dry hole
Dry Creek	Fremont		Dakota and below		Wind River	One dry hole
Dry Pipey	Sublette				Wasatch	Showings of light oil in Tertiary shales
Dugout Creek	Natrona		Dakota and below		Pierre shale	One dry hole
Dutton Creek	Carbon	4,000	Dakota and below		Wasatch	One producing well, light oil
Dutton Creek	Fremont		Dakota and below		Wind River	Two dry holes
East Foote Creek	Albany				Steele shale	Untested
East Fork	Carbon				Thermopolis shale	Untested
East Sand Draw (See Sand Draw)						
East Teapot (See Teapot Dome)						
Eight Mile Dome	Big Horn				Lance formation	Untested
Eight Mile Lake	Carbon	3,000	Sundance and below	3 sections	Cody shales	Commercial gas production
Elk Basin	Park	2,000	Dakota and below	9 sections	Mesa Verde	Oil and gas production from Frontier sands
Elk Mountain	Carbon				Cody shale	Untested
Embar Dome	Hot Springs				Chugwater	Untested
Emigrant Gap Dome	Natrona		Tested to granite	22 sections	Mowry shale	Seven dry holes
Enos Creek	Hot Springs	2,500	Dakota and below		Mesa Verde	One commercial gasser
Evanston	Uinta				Tertiary	One dry hole

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Ferris Field	Carbon	2,000	Madison	10 sections	Steele shale	Oil production and deep oil production in Tensleep
Fiddler Creek	Weston				Pierre shale	Untested
Flat Top Dome	Carbon				Chugwater	Untested
Fort Steele	Carbon				Steele shale	Untested
Fossil Field	Lincoln	400		1 section	Tertiary	Small oil wells making light oil
Four Bear	Park				Chugwater	Black oil in Tensleep
Frannie	Big Horn	2,000	Amsden and Madison		Mowry	Black oil from Embar or Tensleep
Freeland	(See Bodie Dome)					
Freeze Out Dome	Carbon				Chugwater	Untested
Frontier Dome	Big Horn				Niobrara	Untested
Frost Ridge	Big Horn				Mesa Verde	Untested
Garland	Big Horn	2,500	Sundance and below		Niobrara	Gas in Frontier, black oil in deep sands
G. P. Dome	Carbon	1,800	Sundance		Steele shale	Oil production, mixed base
Geary Dome	Natrona (See Cole Creek)					
Gebo Dome	Hot Springs		Dakota and below		Mesa Verde	One dry hole and well drilling
Gillette Dome	Campbell				Tertiary	Untested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Gillespie Dome	Albany				Benton	Untested
Glendo Monocline	Platte				Mowry	One dry hole flowing water
Golden Eagle Dome	Hot Springs		Sundance and below		Mesa Verde	Two gas wells in Frontier are exhausted and abandoned
Gooseberry Dome	Park				Mesa Verde	
Goose Egg Dome	(See Bessemer Bend)					
Gose Dome	Weston				Carlisle shale	One deep test abandoned
Goshen Dome	Goshen				Tertiary	One deep test abandoned
Gothberg Dome	Natrona (See North Casper Creek)					
Government Hill	Natrona		Sundance and below		Benton	Two dry holes
Granger Dome	Sweetwater				Tertiary	Untested
Granville Dome	Carbon				Lewis shale	Untested
Grass Creek Field	Hot Springs	900 and 4,000	Madison and below	9 sections	Mesa Verde	Oil production in Frontier of light oil and black oil in Tensleep, Embar and Madison
Greybeal	Natrona	4,500	Amsden and Madison		Pierre shale	Deep dry hole
Greybull	Big Horn	600	Dakota and below	1 section	Tertiary	Shallow production light oil
Gray Rocks	Platte		Amsden and Madison		Chugwater	Dry hole abandoned
Green River Dome	Sublette				Tertiary	Untested
Grey's River	Lincoln				Mowry and Aspen	Being tested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Guernsey Dome	Platte				Sundance	Shallow test abandoned
Gyp Creek	Big Horn				Cloverly	Untested
Gyp Springs	Hot Springs				Thermopolis shale	Untested
Half Moon	Park				Carlile	Being tested
Hale Dome	Hot Springs				Morrison	Untested
Hamilton Dome	Hot Springs	1,500	Tensleep and below	4 sections	Cody shale	Black oil production from Sundance
Hiawatha Dome	Sweetwater (Partly in Colorado)	2,500+	Tertiary sands and Cretaceous	No estimate	Tertiary	Gas production from sands in Wasatch formation
Hidden Dome	Washakie	2,000	Embar and below	No estimate	Thermopolis	Gas production from Dakota
Hilliard Dome	Uinta				Tertiary	Shallow test abandoned
Hjorth Dome	Carbon				Mesa Verde	Several abandoned tests
Horse Creek	Albany				Pierre shale	
Horsehoe Dome	(See Muskrat)					
Horsetrack Dome (Pickett Lake)	Carbon				Steele shale	One deep test abandoned
Horton Dome	Washakie				Mesa Verde	Untested
Howard Dome	Weston				Tertiary	Untested
Hudson Dome	Fremont	1,000 and 2,800	Amsden and Madison	3 sections	Chugwater	Black oil production from Embar and Tensleep
Hurst Dome (Spence Dome)	Big Horn				Morrison	Partially tested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Ilo Ridge Dome	Hot Springs				Mesa Verde	Partially tested
Indian Creek Dome	Niobrara				Pierre shale	Untested
Iona or Ionia Dome	Big Horn				Cloverly	Untested
Iron Creek Dome	Natrona	1,200 to 2,200	Amsden and Madison		Dakota	Gas production abandoned as exhausted
Irvine Dome	Converse		Sundance and below		Tertiary	Dry hole
Islay Dome	Albany				Pennsylvanian	Untested
James Lake Dome	Albany				Steele shale	Partially tested
Kayese Dome	Johnson				Dakota	One dry hole
Kelly Dome	Fremont				Pennsylvanian	Untested
Kemmerer Dome	Lincoln				Aspen shale	Partially tested
Kirby Creek Dome	Hot Springs				Frontier	Partially tested
Knights Dome	Uinta				Sundance	Untested
LaBarge	Lincoln and Sublette	1,500	All Cretaceous sands	10 sections	Tertiary	Light oil production from Tertiaries and lenses.
LaBonte	Converse				Chugwater	Untested
La Flame	Crook				Graneros	Untested
Lake Creek	Hot Springs	2,000	Amsden and Madison		Cody	Black oil production from Embar sand
Lake Hattie Dome	Albany				Mesa Verde	Partially tested
Lake Valley Dome	(See Eight Mile Lake)					

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Lamb Dome	Big Horn				Niobrara	Untested
Lander Dome	(See Hudson Dome)					
Lance Creek Field	Niobrara	3,800	Sundance and below	12 sections	Pierre shale	Light oil producing field from Muddy and Dakota sands
Lane Dome	(See Notches)				Hilliard shale	Untested
Lasell Creek	Uinta				Aspen shale	Untested
Leroy Dome	Uinta				Tertiary	Deep test drilled over a mile but did not penetrate Cretaceous
Lingle Dome	Goshen					
Little Buffalo Basin	(See under B)					
Little Creek Dome	Albany				Benton	Untested
Little Dome	(See Maverick Springs)					
Little Grass Creek Dome	Hot Springs	2,000	Dakota and below	4 sections	Mesa Verde	Gas production from Frontier
Little Pole Cat Dome	(See Danker Dome)				Lower Pennsylvanian	Being tested
Little Sheep Mountain Dome	Big Horn				Steele shale	Untested
Logan Gulch	Fremont				Wasatch	Untested except in shallow parts
Lost Creek Anticline	Sweetwater					
Lost Soldier Anticline	Carbon	2,000 to 4,000	Amsden and Madison		Tertiary	Gas and oil production from Frontier, Dakota and Sundance formations

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Lovell Dome	Big Horn				Niobrara	Partially tested
Lox Dome	Natrona	1,800	Dakota and below		Niobrara	One well shows oil and gas in Frontier formation
Lucerne Dome	Hot Springs				Mesa Verde	Partially tested
Lusk Dome	Niobrara				Pierre shale	Untested, White River also on surface, unconformably
Lysite Mountain Dome	Hot Springs				Frontier	Untested monocline, seeps of heavy oil
Mahogany Butte	Washakie				Cody shale	Partially tested
Mahoney Dome	Carbon	3,000	Amsden and below		Carlile shale	Commercial gas in Dakota and Sundance and oil in Tensleep
Mandel Dome	Albany				Mesa Verde	Untested
Manderson Dome	Big Horn				Niobrara	Untested
Manville Dome	Niobrara				Pennsylvanian	One dry hole
Maverick Springs	Fremont	2,000	Tensleep and below		Carlile shale	Black oil production from Embar sands
McComb Dome	Fremont				Tertiary	One dry hole
McGill Dome	Albany				Niobrara	Untested
McGown Dome	Fremont				Mancos	Partially tested
McKinley Dome	Converse		All sands drilled through to granite		Tertiary	Drilled and abandoned
Mease Dome	(See Dry Creek)					

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Medicine Bow Dome	(See Hjorth Dome)					
Megown Dome	(See McGown Dome)					
Meilan Dome	Natrona		Sundance and below		Niobrara	One dry hole
Mercer Dome	Big Horn				Chugwater	Untested
Midway Geary Dome	Natrona		Dakota and below		Mesa Verde	One producing well
Millbrook Dome	Albany				Mesa Verde	Untested
Miller Hill Dome	Carbon				Frontier	Partially tested
Monument Dome	Park				Dakota	Untested
Moorcroft Monocline Field	Crook	900	Below Dakota	2 sections	Graneros shale	Black oil production in Dakota sand
Morris Dome	Big Horn				Morrison	Untested
Mormon Butte Dome	Big Horn				Niobrara	Untested
Morton Dome	Washakie				Cody shale	Untested
Mud Creek Dome	Hot Springs				Dakota	Partially tested
Muddy Creek Dome	(See Dad Dome)					
Mule Creek Dome	Niobrara	1,200	All tested	4 sections	Niobrara shale	Light production from Lakota sand and asphalt base oil in Minnelusa sand
Murphy Dome	Hot Springs				Chugwater	Black oil production from Embar sand
Muskkrat Dome	Fremont	4,200	Dakota and below		Tertiary	Gas production from Muddy sand
Natrona Dome	Natrona				Pierre shale	Untested

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Neiber Dome	Washakie				Mesa Verde	Partially tested
Newcastle (Salt Creek)	Weston				Dakota	Partially tested
North Baxter Basin	(See Baxter Basin)					
North Casper Creek	Natrona	4,000	Amsden and Madison	2 sections	Pierre shale	Gas in Muddy at 900 feet and black oil at 3200 in Tensleep
North Oregon Basin (Wiley Anticline)	Park				Mesa Verde	Partially tested
North Sunshine Dome	Park				Mesa Verde	Partially tested
Notches Dome	Natrona	2,000	Amsden and Madison		Benton	Black oil production
Nowood Anticline	Washakie				Cloverley	Partially tested
O'Brien Springs	Carbon				Mesa Verde	Gas in Frontier sands
Oil Creek	Weston				Pierre shale	Partially tested
Oil Mountain	Natrona		Tensleep and lower		Steele shale	Tested and abandoned
Oil Springs Dome	Carbon				Mesa Verde	Partially tested
Old Woman Dome	Niobrara				Dakota	Partially tested, black oil
Oregon Basin	Park	3,500	Amsden and Madison	20 sections	Cody shale	Black oil production from Embar and Tensleep sands
Osage Field	Weston	1,500	Tensleep and below	8 sections	Pierre shale	Light oil production in Muddy sand
Paint Rock Dome	Big Horn				Dakota	Partially tested

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Palmer Dome	(See Emigrant Gap)					
Parco Dome	Carbon				Steele shale	Untested
Pass Creek	Carbon				Frontier	Untested
Pedro	Weston	400	Muddy and below	2 sections	Pierre shale	Light oil production from shale
Pickett Lake (Horse Track)	Sweetwater				Wasatch	One dry hole abandoned
Picnic Grounds	(See Fort Steele)					
Pilot Butte	Fremont	900	All sands		Wind River	Light oil production from shale
Pine Mountain	Natrona	1,800	Amsden	4 sections	Dakota	Showings of black oil and gas
Pinto	Park				Mesa Verde	Untested
Pitchfork	Park		Embar		Cloverley	Being tested, black oil showing
Place Dome	(See Emigrant Gap)					
Plunkett Dome	Fremont	400	All sands		Benton shale	Light oil production from shale
Poison Lake	Converse				Dakota	Untested
Poison Spider	Natrona	2,000	Drilled to granite	6 sections	Dakota	Black oil and gas production from Sundance, Embar and Tensleep
Portland Dome	Carbon				Steele shale	Untested
Potato Ridge	Big Horn				Niobrara shale	Untested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Powder River	Natrona					
Puddle Springs	Fremont (See Muskrat)		Dakota and below		Pierre shale	Some gas in Frontier sands
Pump Creek Dome	Weston					
Quealey Dome	Albany				Dakota	Untested
Rattlesnake Dome	Natrona				Mesa Verde	Partially tested
Rawhide Creek	Goshen				Steele	Partially tested
Rawlins Dome	Carbon				Arikaree	Untested
Red Creek	Sweetwater				Mesa Verde	Untested
Red Desert Anticline	(See Lost Creek)				Mesa Verde	Untested
Red Dome	Big Horn				Wasatch	Untested
Red Fork Dome	Johnson				Niobrara	Untested
Red Springs	Hot Springs				Chugwater	Untested
Rex Lake	Albany	3,000	Sundance and below		Thermopolis	Untested
Richards Dome	Hot Springs				Mesa Verde	Light oil production from Muddy sand
Richards Dome	Fremont				Chugwater	Untested
Riverton Dome	Fremont		All sands		Fort Union	Untested
Rock Creek (Rock River)	Carbon	3,200	Sundance and below	7 sections	Wind River	Untested
Rock Springs	(See Baxter Basin)				Mesa Verde	Light oil production in Muddy sand

TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Rocky Ford (Rocky Point)	Crook	400		1 section	Morrison	Black oil production in Sundance sand
Rozet Dome	Campbell				Tertiary	One dry hole did not reach sands
Sage Creek Dome	Carbon				Hilliard shale	Untested
Sage Creek Dome	(See Cowley)					
Sage Creek Dome	Fremont	1,800	Tensleep and below		Morrison	One test found black oil in Embar but abandoned
Sage Hen Dome	Converse	.			Cloverley	Untested
Salt Creek	(See Newcastle)					
Salt Creek	Natrona	1,200 2,000 2,500	All tested	15 sections	Mesa Verde	Greatest light oil field in Rocky Mts.
Sand Draw	Hot Springs			1 section	Eagle S. S.	Test now drilling
Sand Draw	Fremont	3,000	Dakota and below	10 sections	Mesa Verde	Gas production from Frontier sands
Seaman Hills	Natrona				Tertiary	Untested
Separation Flats	Carbon				Steele shale	Untested
Seven Anticlines	Carbon				Cloverley	Untested
Seven Mile Dome	Albany				Mesa Verde	Untested
Shannon Dome	Natrona	500		2 sections	Parkman S. S.	Light oil production on edge Salt Creek Field
Sheep Creek Dome	Fremont (See Crooks Gap)					

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Sheep Mountain	Fremont					
Sheep Mountain	Big Horn (See Little Sheep Mtn.)				Pennsylvanian	Untested
Shell Creek	Big Horn				Morrison	Untested
Shellbourne	Hot Springs				Chugwater	Untested
Sheidon Dome	Fremont	2,000	Dakota and below		Mesa Verde	Three dry holes, one with small production of light oil
Shepard Dome	Campbell				Tertiary	Untested
Sherrard Dome	Carbon				Mesa Verde	Gas production in Frontier sand
Shirley Dome	Carbon				Cloverley	Untested
Shoshone Dome (Cody)	Park	4,200	Amsden and Madison		Mesa Verde	Showing black oil and hot water, some shale oil at 1,000
Simpson Ridge	Carbon				Mesa Verde	Black oil production at 900 and deep test to 6,200 without finding any sands
Skull Creek	Park				Morrison	Untested
Skull Creek	Weston		Sundance and below		Pierre	One dry hole
Snyder Basin	(See Dry Piney)					
Soda Creek	Weston				Pierre shale	Untested
Sodergren Dome	Albany				Tertiary	Untested
Solo Dome	Sw-etwater				Tertiary	Untested

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
South Baxter Basin	Sweetwater	3,500	Below Sundance	12 sections	Hilliard shale	Large gas field
South Casper Creek	Natrona				Tertiary	Partially tested
South Piney	(See Dry Piney)					
South Sunshine	Park (See Sunshine Basin)					
Spence Dome	Big Horn				Morrison	Partially tested
Spindle Top	Natrona	1,800	Amsden and Madison		Frontier	Black oil production from Sundance sand
Split Hill	Converse				Tertiary	Shallow test only
Spring Creek	Fremont (See Crooks Gap)					
Spring Creek	Park					
Spring Valley	Uinta	900-1,500			Mesa Verde	Untested
Steele Creek	Johnson				Aspen shales	Light oil production in sand lenses in shale beds
Stockade Beaver	Weston				Steele shale	One dry hole
St. Mary's	Carbon				Morrison	Partially tested
Sugar Creek	Carbon				Mesa Verde	Partially tested
Sunshine Basin	Park				Mesa Verde	Untested
Teapot Dome	Natrona	3,000	Dakota and below	7 sections	Mowry shale	Partially tested
Tensleep Dome	Washakie				Steele shale	Light oil and gas production from Frontier Sands
					Morrison	One deep test abandoned

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Thermopolis Dome	Hot Springs		Amsden and Madison		Morrison	Several shallow tests abandoned
Thornton Dome	Weston	500	All sands		Tertiary	Light oil production in shale
Tisdale Dome	Johnson	3,000	Amsden and Madison		Mowry shale	Hot water in Tensleep
Torrington Dome	Goshen (See Goshen Dome)					
Torchlight Dome	Big Horn	1,000	All sands	2 sections	Mesa Verde	Light oil production in shale
Triangulation Dome	Natrona (See Emigrant Gap)					
Troublesome Dome	Carbon				Tertiary	Untested
Two Bar Dome	Natrona				Morrison	Untested
Two Rivers	Albany				Niobrara	Untested
Upton Thornton	Weston (See Thornton)					
Vermillion Dome	(See Hiawatha)					
Virginian Dome	Natrona (See Emigrant Gap)					
Wagon Hound Dome	Hot Springs					
Wakeman Dome	(See Thornton)				Thermopolis	Partially tested
Walcott Dome	Carbon					
Wallace Creek	Natrona				Mesa Verde	Untested
Wansutter Arch	Sweetwater				Mesa Verde	One deep dry hole
Warm Springs	Hot Springs	1,000	Amsden and Madison	4 sections	Tertiary	Untested
					Chugwater	Black oil production from Embar and Tensleep

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TABULATION OF OIL STRUCTURES IN WYOMING — Continued

Field	County	Av. Depth	Sands Not Tested	Estimated Area	Surface Formation	Remarks
Warm Springs	(See LaBonte)					
Waugh Anticline	(See Iilo)					
Waterfall Dome	Lincoln				Aspen shale	One deep dry hole
Wertz Dome	Carbon	3,000	Embar and below		Mesa Verde	Gas production from Frontier and Sundance
West Fork Dome	Carbon				Benton	Untested
West Mule Creek	Niobrara	250	All sands	800 acres	Carlile shale	Four shallow wells producing light oil from shale
West Salt Creek	Natrona	2,000	All sands		Pierre shale	Light oil production from shale on west side Salt Creek field
Wheeler Ranch	Natrona	1,000			Pierre shale	Several shallow dry holes
Whiteface Dome	Fremont				Dakota	Untested
White Horse Butte	(See Hale Dome)					
Wiley Dome	Park (See Oregon Basin)					
Willow Creek Dome	Lincoln				Jurassic	Untested
Wilson Dome	Sweetwater (See Hiawatha)					
Wilson Dome	Natrona				Pierre shale	Untested
Winkelman Dome	Fremont	1,800	Dakota and below		Frontier	Gas production in Frontier
Zeisman Dome	Big Horn				Dakota	Untested
Zimmerman Butte	Hot Springs				Cody shale	One dry hole