TWELFTH BIENNIAL REPORT

OF THE

STATE GEOLOGIST

OF THE STATE OF WYOMING

For the Period
Oct. 1, 1922 to and Including Sept. 30, 1924

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ALBERT B. BARTLETT
State Geologist

1924
Wyoming Labor Journal Publishing Co.
Cheyenne, Wyoming

ALBERT B. BARTLETT.....State Geologist

VAL B. MAGHEE.....Oil and Gas Inspector

PHIL S. HOYT.....Oil and Gas Inspector

THERESA McINERNEY.....Clerk

To His Excellency,
F. E. Lucas,
Acting Governor of Wyoming.

Dear Sir:

Pursuant to the requirements of Section 302, Wyoming Compiled Statutes 1920, I submit herewith the Biennial Report of the State Geologist for the period ending September 30, 1924.

Very respectfully submitted,

ALBERT B. BARTLETT,
State Geologist.

Cheyenne, Wyoming,
October 31, 1924.

Twelfth Biennial Report of the State Geologist

October 1, 1922, to and Including September 30, 1924

MINES AND MINING

The original intent of the law creating the office of State Geologist was that that official should make reports on mining property, to collect official information relating to the various mines and mining projects of the State, and to publish and circulate such information as he may deem advisable for advertising the mineral wealth of the State, and also to take any steps which would be likely to advance the development of the mining industry.

The duties of the State Geologist were increased by the enactment of a law in 1903 making the State Geologist ex officio Inspector of Mines, with power to examine into the condition of any mine, mill, or part thereof, and all matters or things connected with or relating to the safety of the persons employed in or about the same; to examine into and make inquiry respecting the condition of machinery or mechanical devices, and, if necessary, to have same tested; to appear at all coroner's inquests respecting accidents and, if necessary, to examine and cross-examine witnesses. These duties do not apply to coal mines, as they are under the supervision of the Coal Mine Inspectors who are not connected with the office of the State Geologist, but do apply to quarries, metal mines and other mining operations.

The requirements of the State Geologist were still further enlarged by the action of the Legislature in 1919 making it the duty of the State Geologist to make examinations and reports on any State or school lands when so requested by the State Land Board or the State School Land Board, and to make written report concerning the geology of any lands in which the State of Wyoming is or may hereafter become interested, and on such other matters as the respective State Boards have to do with State lands or State school lands may desire information upon. He is further charged with the duty of enforcing the laws of the State of Wyoming relating to the oil industry.

The laws of 1921 provide for conservation of the natural resources of the State under the supervision of the State Geologist relating to the oil and gas wells and have caused a further increase in the activities of the office. Under this law has been formed a Department for the conservation of oil and gas as part of the State Geologist Department. At the present time this consists of two oil and gas inspectors, one of them located at Casper and the other at Lander, their duties being to make inspections of wells throughout the State, to supervise repair work, together with other duties along the same general lines, including production tests of both oil and gas and reporting on their activities.

The work of the State Geologist Department under the four lines of activity mentioned above will be described more fully in the succeeding pages of this report.

Mining Industry

As the result of the industrial depression following the late war, the mining industry has been suffering from inactivity, not only in Wyoming but throughout the entire Nation, as the result of over-supply in iron, copper and other metallic minerals as well as a number of non-metallic minerals. On account of high cost of operation, the mining of gold and silver was less profitable than before, and not attractive from an investment point of view. The surplus stock of metals has been gradually absorbed by the industries but the process was slow, as mining operators found it more unprofitable to shut down entirely than to continue operations even at a slight loss. It was the logical result of these operations that new mining enterprises were not being developed; capital was not seeking investment in mining ventures and the mining industry in Wyoming has made little progress during the last few years. Although Wyoming probably has the greatest undeveloped mineral resources of any state in the Union, the development has been backward, mainly because these resources include a smaller proportion of precious metals, which are the first to attract mining development, and which bring in lines of transportation which later result in the development of the less precious metals, which often are really resources of greater extent and value in the end. Wyoming's principal resources include coal, oil, phosphates, potash and a number of other minerals in immense quantities but of comparatively small value per ton, which with high freight rates and long distances to points of consumption bring them into competition with similar products having advantages of low freight rates and short hauls, so that the development of these resources, with the exception of oil,

has been comparatively slow. It seems to be the problem in the development of the mining resources of this State to secure low freight rates and to find and build up large markets.

The State Geologist's Office is endeavoring to be of every possible assistance to the mining industry in finding markets for its products, and in future years can be of still greater assistance. Manufacturing has become the greatest industry of the United States and its development is being aided by research work of engineers and chemists who are continually seeking new products for accomplishing certain definite objects in manufacturing processes. In these investigations it is frequently found that some mineral hitherto considered of interest only as a mineralogical specimen is of actual commercial value for some manufacturing process. As an example of this, it has been found that cyanite and sillimanite, silicates of aluminum, are very valuable in manufacturing porcelains for spark plugs, and the United States is being combed by representatives of spark plug manufacturers for deposit of these minerals. Wyoming is known to contain one of these minerals but whether it occurs in commercial quantity and purity has not yet been determined.

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Through the newspapers and other agencies the State Geologist is endeavoring to keep mining operators informed as to the market and demand for these and other mineral products, with the hope that commercial deposits may be brought to light, resulting in their development. Owing to the fact that new uses are being found continually for minerals previously considered to be of no value, it is important that the State Geologist should keep informed on this subject and be prepared to identify all minerals sent in for examination, and to learn of deposits of such minerals, their extent and location with respect to transportation, even though the minerals at this time may not be considered of commercial value. In order to keep informed on these subjects and also to be in a position to inform the public, the State Geologist has commenced to assemble specimens of the various minerals of the State, and is also securing from outside of the State specimens of minerals which have not previously been known in Wyoming but which should occur in this State, and which may be brought to light at any time. Many of these materials are of very ordinary appearance. Some of them resemble each other closely and it is almost impossible for the average prospector to make tests in the field by which he could determine one from another.

In view of the ever increasing value and demand for these minerals, it is very important that the State should have an agency capable of making these determinations and of identifying such minerals when they are sent in for inspection. This office at the present time has but very little equipment for determination of minerals, its equipment being limited to a small blow-pipe outfit. This outfit is useful only for determining the ordinary minerals but is inadequate for the identification of rare and unusual minerals. In order to be in a position to keep the public fully informed regarding the identification of all minerals, the office should either be equipped with a good laboratory or else funds should be made available by which the State Geologist can send the specimens to well equipped laboratories for full determination. Determinations of rare and unusual minerals are expensive but valuable. The present intent of the laws regarding the identification of minerals by the State Geologist is that he should not make an assay but merely make an inspection of the specimen and give the operator the result of that inspection. Methods of this kind were satisfactory a few years ago when the presence and importance of rare and unusual minerals in Wyoming were not known and probably not even suspected. With the new minerals which are coming to light, it is impossible for any one to make a reliable identification without having access to a complete laboratory, and as there does not seem to be space available for the State Geologist to have such a laboratory in the Capitol Building, it is recommended that for the next two years the State Geologist be allowed a small additional amount annually to be used according to his own judgment for having assays, tests and determinations made on any minerals on which he considers these tests to be justified.

The State Geologist's Office is occupying the same quarters that it has occupied for the past fifteen or twenty years and it is now doing about four times as much business as it formerly did, and as a considerable volume of records have accumulated, and the library has grown, larger quarters should be provided for this Department. Although the State has had a Geologist for a great many years, there has been no collection of rocks and minerals in this Office by which to display to callers and visitors the variety, quality and extent of the mineral resources of this State. Feeling that the preparation of such an exhibit is a vital part of the duties of the State Geologist, it has been the policy of this administration to commence the assembling of such an exhibit. Some good results have been accomplished in the past two years but a great deal is still to be desired. Before it is possible to have a comprehensive exhibit of the specimens of the minerals considered in representing Wyoming's principal resources, it is necessary to have more space in which to display these minerals and this makes another reason for more room in the Capitol for this Department.

It will be well to mention here some of the discoveries during the past few years and also some of the minerals which have been known for a number of years but which may become important in the near future.

Probably the most spectacular event was the discovery of platinum and palladium in vein form near Centennial. This discovery was made in the fall of 1923, newspaper accounts crediting the unofficial assays with values of $422.00 per ton in platinum and palladium. The State Geologist visited the locality in November, 1923, and took samples from the discovery tunnel, taking the usual precautions against salting. These samples were submitted to the Mining Department of the University of Wyoming for assay and a report was submitted to the effect that one of the samples carried $445.00 per ton, another $590.00 per ton, the values being mainly platinum, while the other samples were barren. A sample taken at a later date and sent to the United States Bureau of Mines, Precious Metal Station, Reno, Nevada, was reported to contain the equivalent of 11 ounces of palladium per ton, which would give it a value of between $600.00 and $700.00 per ton, in addition to considerable nickel.

At the present time it is impossible to predict the commercial outcome of this discovery but it is certainly interesting from a scientific point of view, as it is the first known discovery in the world of rich platinum in vein form. The principal source of platinum in the world is the placer operations in which the platinum is mainly associated with gold. Few localities are known in which platinum occurs in vein form associated with other minerals but in which the platinum content is not high enough to justify mining for platinum alone, platinum being merely saved as a by-product. This discovery of rich platinum in vein form is therefore very interesting. Platinum is not unknown, however, in Wyoming, as both platinum and palladium have been known to occur in the Rambler Mine, which is about eight miles southwest of the Centennial discovery.

Geologically, the Centennial district is a metamorphic complex of schists and gneisses, with both acid and basic intrusions. The planes of schistosity are nearly vertical and have a northeast southwest trend. As the Rambler Mine is in a southwestern direction from the Centennial discovery, approximately the direction of the strike of the schist, the possibility is suggested

that there may be a belt in the schist in which platinum may be found. The platinum in the Rambler Mine is associated with copper, the ore being a covellite. In the Centennial discovery tunnel the platinum is in small cross fractures, which cross the schist nearly at right angles. Although the tunnel was driven for the purpose of prospecting a small occurence of copper, there appears to be but little copper associated with the platinum in this small vein. The owners of this discovery tunnel believed that the proper way to prospect their tunnel was to run a tunnel at the foot of the mountain in the hope of getting a vein at depth, as the discovery tunnel was situated at a point rather high on the mountain side and was not only inaccessible through the winter months but could not gain any considerable depth with length. This lower tunnel was, therefore, worked on for a number of months until the operators ran short of money, without encountering the platinum vein. A sample taken by the State Geologist at the face of this tunnel in May, 1924 was reported by the United States Bureau of Mines, Precious Metal Station, to contain traces of gold and platinum, but it was evident that the discovery vein had not been reached. The State Geologist has urged these operators to work in their discovery tunnel and follow their rich platinum ore to determine its extent and character, and has been assured only recently that this would be the next operation undertaken.

As the result of the attention attracted by the high assays obtained from specimens taken from this tunnel, the district was the scene of a considerable rush during the winter months and more than 1000 claims were recorded with the County Clerk of Albany County. Owners of a number of these claims have reported platinum assays of value from their properties and the State Geologist has made every effort to examine these properties and check up on the claims. Several trips have been made into the district and the most promising of the prospects have been visited and sampled. The result of the assays that have been made by the United States Bureau of Mines, Precious Metal Station, shows that high grade platinum had not yet been uncovered in any of these claims, although some few of the assays showed traces. This does not necessarily condemn the whole district, however, but suggests the idea that prospecting for platinum will be an expensive operation and that the platinum, even if present, will be hard to find. In connection with the discovery tunnel it is very doubtful if any one could detect the presence of platinum from surface operations, the platinum veins having been encountered by accident underground while prospecting for copper.

The latest trip made by the State Geologist into the region was in October, 1924 and a number of samples were taken from claims not previously visited. Of these samples, one showed a trace of platinum, according to the assays, while others contained none. Samples were all run for gold, however, and the results may prove to be interesting as all of the samples showed gold in small quantities but rich enough for commercial operation if the same values hold out during further development. Practically all of the samples were taken not far from the surface, usually in ten foot holes. Though it is impossible to make any predictions as to the commercial possibilities, on two claims, which are located upon large hornblend ledges, assays ran from $4.00 to $6.80 per ton. Should these values continue in depth; the discovery would be of considerable importance.

Some placer operations were attempted during the year 1924 in the Middle Fork Canon, a pipeline about two miles long having been constructed during the winter months. Operations were discontinued in the summer on account of being unsuccessful but the operators expect to make changes in their methods and resume operations next summer. The placer ground was not thoroughly sampled by pits and the operators believe that they commenced work on a portion of their ground which was unfavorable for profitable operations. Before work is resumed they plan to thoroughly sample the ground and also to make certain changes necessary in their methods. Until the ground is sampled and the amount and character of the gravel determined, it is impossible to state whether the operations will be profitable.

The Medicine Bow Range, which includes the Centennial district and the Rambler Mine, consists of something like 1000 square miles of pre-Cambrian rocks, which justify prospecting for gold and possibly other metals. There are a number of promising gold prospects in the range at the present time and it is not unreasonable to believe that one or more paying gold mines will eventually be developed. This area is one of the few parts of the United States not covered by survey of the United States Geological Survey and the State Geologist has been urging that Department to make a complete geological survey of the region at the earliest possible date.

Within the past two years discoveries of vanadium and chromium on the Casper Mountain have been announced. Vanadium assays obtained by the discoverer run as high as 18% vanadium pentoxide, although samples submitted to the State Geologist and sent out for assay have run only 1.55% to 2.55%. The discovery has not yet been fully enough investigated to warrant any announcements at this time, except that

there is no question as to the occurrence of the vanadium, the question being as to the grade and amount of ore. The discovery of chromium on Casper Mountain was reported to the Office so recently that we have been unable to investigate. According to a letter received from the operators, their developments have not progressed sufficiently to demonstrate the occurrence of commercial ore bodies, but, from what small development work has already been done, they feel that the chances for the developing of large tonnages of commercial ore are very good. The State Geologist plans to make a careful examination of the chromium and vanadium discoveries during 1925, as they have possibilities of developing into something important. Casper Mountain is a location of considerable mineralization and, in addition to the discoveries already mentioned, contains one of the largest bodies of asbestos in the world. Distance from markets has prevented the development of this asbestos in the past, but it will not be surprising to see this deposit opened up within the next few years with operations on a large scale.

Extending along the western part of Platte County is a wide belt of metamorphic rocks in which a number of non-metallic minerals have already been discovered and in which additional discoveries can be expected. These minerals include cyanite, garnet, talc, kaolinite, graphite, mica, feldspar, and, in addition to these non-metallic minerals, molydenum. Small shipments of garnet and talc are reported to have been made from deposits near Wheatland for testing purposes and, if freight rates are not excessive, it is probable that these deposits will be placed on a shipping basis. The market for graphite is rather unfavorable at the present time, owing to competition from foreign supplies and large accumulation of stocks following the War, but conditions are likely to improve and, as this graphite is of high grade and in large quantities, it should eventually find a market. There is a good demand for cyanite but, up to the present time no discoveries of commercial importance have been made, although a number of small high grade samples have been secured. The discoveries of cyanite have been urged to do sufficient stripping and other development work on these ledges to make it possible to get a reliable idea as to the extent and character of the minerals present and, as soon as this is done, the State Geologist will visit the localities and report on the discoveries. Up to the present time the State Geologist has not been advised that this development work has been undertaken. Mica occurs in a number of places in this belt of metamorphic rocks and in one locality a very good deposit is being developed. This mica occurs in a pegmatite dyke, from which it is to be separated from feldspar, after which it

will make a high grade ground product. Eventually the feldspar can be marketed, as there is a great demand for this mineral and a steady market for it in the Eastern United States. Freight rates, however, to points of consumption at the present time will not permit Wyoming feldspar to compete with the Eastern product.

The South Pass Atlantic City gold district is one of the oldest gold camps in the United States and, therefore, cannot be called a discovery at this time, but it is worth while to note that, although this camp has been comparatively inactive for the last twenty years or more, it is showing evidence of a revival of activity which is hoped will result in the opening of some of the most important gold mines in the West. Several million dollars were taken from the principal mines of this district in the early days from the high grade enriched surface workings, subsequent developments showing that with depth the ore is of low grade but in large quantities. Properties of this kind require large amounts of capital for the necessary development of the ore bodies and for the construction of mills necessary to extract the values and, as fuel and transportation conditions have been unfavorable, the camp has remained undeveloped. The recent discovery of a gas field and improvement of roads and trucking conditions have changed the situation and capitalists have been investigating the district. As the result of these investigations and a more promising outlook for the gold mining industry, it is hoped that this district will at last come into its own and be listed among the country's most important gold producers.

Another resource upon which development has recently been resumed is the sulphur found in the vicinity of Thermopolis. This sulphur occurs associated with gypsum from which it is separated by a steaming process producing nearly pure sulphur, the residue, consisting of gypsum and sulphur, is ground up and marketed as a fertilizer, which is very valuable. Sulphur is a necessary factor in plant growth and where soils are deficient in this element as, for instance, in some parts of the State of Oregon, it has been found that crops are greatly increased by the use of gypsum or sulphur as a fertilizer. Some of the Oregon experiments showed an increase of 100% in the production of alfalfa as the result of the use of gypsum or sulphur fertilizer.

This Office has received and answered a large number of inquiries regarding gypsum and bentonite, minerals which occur in many parts of the State which are important resources and which will eventually be produced on a large scale. There are several plants producing gypsum in Wyoming at the present

time, the most important being at Laramie and in the Big Horn Basin. Building blocks made from gypsum are very desirable for construction of buildings of all kinds and are proving very popular in the regions near the gypsum plants. Bentonite is being shipped from a quarry near Medicine Bow and is treated in a plant in Cheyenne. Shipments are also being made from other points in Wyoming. There is a growing market for this product which will eventually result in the erection of plants in various parts of the State. Inquiries have been received at this office for zircon minerals also minerals of the zeolite group. None of these minerals have as yet been reported in Wyoming and are mentioned here so that if prospectors know of these minerals they will report to this office and we will put them in touch with the parties who made the inquiries.

The State Geologist's office in 1920 issued Press Bulletin Number 10 on the mineral resources of Wyoming. These bulletins have been in great demand, not only in Wyoming but throughout the entire United States and the supply has just recently been exhausted. Since 1920 a number of new discoveries have added to these estimated resources and considerable new information has been acquired regarding the resources already described in the Bulletin. Owing to the importance of the mineral resources of Wyoming, it will be the policy of this Office, if funds are available, to re-write this Bulletin and publish it in pamphlet form with illustrations. In the long run, this method will probably prove more economical than the present method of issuing a mimeograph bulletin on account of the saving in paper, labor and postage, and in the increased value of the Bulletin to those receiving it.

The Office is receiving an ever increasing number of letters of inquiry relative to the mineral resources of this State and is frequently called upon to furnish special articles for the use of newspapers, encyclopedias, technical papers and libraries, in the various part of the United States. It is plainly evident that the mineral resources of Wyoming are becoming more important than ever before to mining men of this country. With the expected revival in business conditions there will be large markets for a great variety of metallic and non-metallic minerals, and the time is not far distant when the State Geologist's office should have an addition to its working force in the form of an expert mineralogist who can be kept in the field during the entire year whenever weather conditions permit, making examinations and investigations of the mineral resources of the entire State. As the State Geologist has to take care of an increasing number of letters of inquiry, office calls, conferences and reports, it is becoming more difficult every year for him to

spend any great amount of time in the field, especially in the more distant parts of the State.

Attention should be called to the fact that the development and activity of the oil industry in Wyoming during the recent years of depression have been a great boon to the people of Wyoming and have lessened the hardships caused by the agricultural depression. The development of the oil industry has furnished a market for all kinds of agricultural products at better prices than could be secured outside of the State, and has also been a source of profitable labor for those who found it necessary to leave the farms a portion of the year. Eventually the oil resources will become depleted and the importance of the industry will slacken. Since Wyoming has other and greater resources capable of furnishing industry and prosperity to the State of Wyoming, every effort should be made to promote the development of these resources, so that the State can be kept continuously prosperous and, while the oil industry is of far greater importance than all the other mineral industries of Wyoming at the present time, these other industries should not be lost sight of, and advantage should be taken of the prosperity caused by the oil industry to create interest in the development of the other mineral resources.

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Exhibits of the minerals comprising Wyoming's resources are important in advertising them to the public and should be displayed whenever possible. At the State Fair, 1923, the State Geologist was made Superintendent of the mineral exhibit and, although he was not advised of this fact early enough to permit the assembling of a comprehensive exhibit, it was possible to make a good display. The opportunity for making a display at the 1924 State Fair was much more favorable and a number of very good exhibits were secured. These included asbestos, sulphur, soda, Epsom salts, gold, copper, lead, iron, coal, mica, zinc, aluminum, bentonite, phosphates, graphite, gypsum, manganese, mica, platinum, limestone, brick clay, agates, garnets and other economic minerals, including cyanite, kaolinite and glass sand. A number of representative fossils were also on display.

The attention of prospectors and owners of mining property and mining operators is especially invited to these exhibits at the State Fair. The State Fair attracts a great many people and it is a wonderful opportunity to advertise our mineral resources. The State Geologist is making arrangements with the State Fair management to make this mineral exhibit a permanent affair, so that when minerals are once sent they will not be lost or thrown away, but will be held over for the succeeding years. What we desire to do is to have these minerals arranged

in cases where they can be protected from dust and where they can be visited and examined any time during the year. For the purpose of this exhibit the displays of each mineral product should be of fairly good size, not less than one hundred pounds to each sample, which makes the display a great deal more impressive than a few small pieces would do. With each individual display assays and analyses should be furnished, together with any other interesting or important information regarding the deposits. The State that has the most important mineral resources of any state in the Union is certainly overlooking its opportunities when it fails to have large and comprehensive displays of its minerals.

Subsequent to the 1924 State Fair the Casper Chamber of Commerce requested small specimens from a number of the representative displays at the Fair for use in its thirty day exhibit at Casper. The State Geologist was pleased to be able to comply with this request and to note the interest taken by the Casper Chamber of Commerce in its display of Wyoming resources. As previously mentioned in this report, it is also the desire of this Office to have small specimens representing all of Wyoming's mineral resources, as well as of other rocks and minerals and important metals from outside of the State which may ultimately be discovered in Wyoming, on display at the State Capitol in Cheyenne. Prospectors and mining operators are urged to supply the State Geologist with specimens of their mineral products and to prepare good sized exhibits for the State Fair. It is not necessary to wait for the State Fair, as these exhibits can be sent to the Secretary of the State Fair at Douglas any time during the year and they will be taken care of.

While on the subject of the State Fair it is appropriate to mention the splendid oil exhibit of the Standard Oil Company and Midwest Refining Company at Casper. This exhibit was not a part of the mineral exhibit but was displayed in the Wyoming Products Building where Wyoming products of various kinds were shown. This oil exhibit included crude oil from the various Wyoming fields and the various refined products, including a number of grades of lubricating oils, fuel oils, gasoline, paraffin, asphalt and roofing. The exhibit also included a miniature oil field in actual operation, with wells, derricks, pipe lines, tanks, etc., and was one of the most interesting exhibits of the entire Fair. It included also a miniature refinery. These exhibits are of great educational value in showing the people what can be done with our mineral resources and in illustrating the manner in which the operations are carried on.

Mineral Inspections

Owing to the fact that the mining industry in Wyoming has been comparatively inactive during the past biennium, the number of inspections of mines has not been large. Only one accident occurred during the period, this being a case of carbon monoxide gas poisoning at a copper prospect near Tie Siding. The State Geologist was notified of this accident and was on the ground promptly. A careful investigation was made and testimony was heard from all of those present. No loss of life resulted from the accident but if it had not been for the rendering of prompt assistance by others at the mine, it might have resulted fatally for two men who were gassed and were unable to get out without assistance. The shaft was only 44 feet deep and a case of gas poisoning from the fumes of blasting powder with such a shaft is something very unusual. It appears that a round of shots was fired at 5:00 in the afternoon and men entered the shaft at 8 the next morning without taking any precautions to drive out the powder smoke, not believing that any precautions were necessary. They were immediately overcome and only with great difficulty brought to the surface and revived. It appears that the weather during the night had been very foggy and still and, as carbon monoxide gas has almost the same specific gravity as air, it is evident that there had not been sufficient air movement during the night to remove this gas. The operators were ordered to install a ventilating pipe and to drop lighted papers down the shaft after firing. No further difficulties have been reported.

The Colorado Fuel and Iron Company's iron mine at Sunrise is the most important metal mine in Wyoming and has been included in the mine inspections, also the various limestone quarries in the southeastern part of the State. Other inspections include the Esterbrook Mine, which was in operation during the summer of 1923 and quite a number of inspections of gold and platinum mining operations in the Centennial District.

Reports on State Lands

The Commissioner of Public Lands and State Land Boards have availed themselves to a greater extent of the services of the State Geologist during this biennium than during the preceding two years. The increasing development of the oil and mining industries in Wyoming is continually bringing to light evidences of deposits of value on State lands, on which reports are necessary for the guidance of the Department having these lands in charge. These reports include a geological report on the occurrences of minerals, coal, oil and gas, and include in-

spection of operations and developments and reports as to the character and value of improvements on the State lands. The State Geologist is frequently called upon to give advice as to terms of leases and agreements. The number of reports on State lands relating to oil and gas during the preceding biennium numbered 38. There were 4 reports on coal, 4 reports on minerals: total 46. During the biennium covered by this report the number of reports on oil and gas were 231, coal 7, minerals 11: total 249. These figures show a very heavy increase in the services rendered to the office of the Commissioner of Public Lands and State Land Boards.

Inspection of Oil and Gas Wells

The Legislature in 1921 enacted the laws which are now in force providing for a Department of Oil and Gas Conservation and placing the operation for oil and gas on State and patented lands under the supervision of the State Geologist, the intent of this law being to have this Department to cooperate with the United States Bureau of Mines in preventing waste of the oil and gas resources through negligent methods of operation, prescribing and enforcing rules and regulations governing the drilling, casing and abandonment of oil and gas wells in the State of Wyoming, excepting public lands subject to the Act of Congress approved February 25, 1920. The rules and regulations shall be those from time to time adopted by the Bureau of Mines governing methods of operations of operators upon lands embraced within permits or leases issued under said provisions, and it shall be the duty of all persons and corporations drilling or operating oil or gas wells upon patented or state land to comply with said rules and regulations, and to file with the State Geologist all logs of wells and other reports required thereby, and to case, control and plug all wells therein prescribed.

As this law was passed only in 1921, a great majority of the wells in Wyoming had previously been drilled or were being drilled at that time and during the first two years it was necessary for the State Geologist to organize this Department and endeavor to find and inspect all of the wells in the State coming under its supervision. A great many of the operators were not aware of the new law and it was necessary to find them and notify them. The work was well organized and in successful running condition at the beginning of the biennial period covered by this report, there were still however some operators who were drilling on patented or State lands who had not yet been made familiar with the provisions of the law and were not filing the necessary reports. Even at the present time,

when practically all of the operating companies in the State are familiar with this law, there are occasionally new concerns coming in and commencing drilling operations without communicating with the State Geologist, or without making any effort to determine whether there are any laws regulating the oil and gas operations. It is very important that these operators be found immediately, as soon as their operations commence, in order that they may be given the proper advice and supervision. They are usually smaller concerns and are often not familiar with the best practices in drilling operations and the supervision and advice of our oil and gas inspectors are often of great value to them.

The general public has a very vague idea of the difficulties to be encountered in drilling for oil or gas. They do not appreciate the fact that before drilling operations are commenced an extensive and complete geological examination is necessary, in order not only to determine the depth of the oil sands and whether they should be oil bearing at any particular location, but also the presence and extent of water sands that have caving forms. For drilling a well in new territory it is very essential to know in what sands water is likely to be encountered and to start with a hole of sufficient size, so that water sands can be properly cemented and cased off and drilling continued with smaller sized tools. Some of the smaller concerns, not familiar with geological conditions in this State, will attempt drilling operations without proper understanding of the conditions to be encountered. Such operations are often doomed to failure before they commence. It is the endeavor of this Department to assist these operators with these problems and to insist upon their starting their holes of sufficient size to permit them to be drilled to a depth sufficient to test the formations in which production is to be expected and, in this manner, our services are not only of value to the operating companies but also to the entire State, as it is very important, when an oil structure is being tested, to see that it is fully and properly tested and not abandoned until all of the prospective oil producing formations have been drilled into, if within reach of the drill. The structure which is partially drilled often receives a black eye as the result of abandonment and it may be many years before another company will go back to it and make the necessary expenditure to drill deeper and fully test the structure.

As contemplated by the Wyoming Laws of 1921, this Department has adopted the rules and regulations of the United States Bureau of Mines and has consulted the local members of the Bureau of Mines force very freely and co-operated with

them at every opportunity. We wish to take this opportunity to express our sincere appreciation of the splendid co-operation and assistance rendered us by the members of the United States Bureau of Mines. The operations on government lands are under the supervision of the Bureau of Mines and it very frequently happens that an oil structure will contain lands which are under the supervision of the Bureau of Mines and also under the supervision of the State Geologist. In making a study of underground conditions for the purpose of prescribing regulations tending to prevent the waste of oil or gas, either at the surface or by escaping somewhere in the wells into porous formations, or by entrance of water from water bearing formations into the oil formations through defective casing or other causes, it is very necessary that the State and Bureau of Mines co-operate to the greatest possible extent in studies of these conditions. It has been very gratifying to our Department to have been able to co-operate with the Bureau of Mines successfully in every case.

This Department wishes to acknowledge also the co-operation we have received from practically all of the principal operating companies in Wyoming. In the beginning some of these companies were inclined to resent supervision of their operations by a State Department, but they have now come to realize that our supervision is not inimical to their best interests but, on the other hand, is of a great benefit to them. In the early stages of the oil and gas development of Wyoming there was not apparent the same regard for the conservation of these valuable resources that is now apparent. This change has come as the result of two things: First, a realization on the part of operating companies that oil and gas are exhaustible and limited and when once extracted from the ground they are gone and can never be replaced.

The supervisory operation of the Bureau of Mines has also had a great influence in reducing the waste. A recent bulletin issued by the Bureau of Mines calls attention to the fact that while all of the supervisory work done cannot be directly translated into dollars and cents, some of the work can be. For example, four of the jobs conducted by the Bureau of Mines men amounted to over $307,000 gained to the industry due to a return for the oil recovered, the drilling expense saved, and the preventable losses demonstrated. This amount of money was part of the earning on an appropriation of $47,000 in a two year period and did not include fifty or more other jobs where companies were benefitted in various ways. When such savings as these are demonstrated to the operating companies it is only natural that they should be greatly in favor of proper

supervision of their operations, and should co-operate fully with the Bureau of Mines and with the State Department, as they have done during our administration, with very few exceptions.

Our State Conservation Department has not been in operation long enough to have undertaken repair jobs of the magnitude of those of the Bureau of Mines just referred to, but during the summer of 1924, in addition to other activities, the oil and gas inspectors have had supervision over repair work in four fields where it was felt necessary to have personal supervision most of the time that the repair work was in progress. These fields are Warm Springs, Hudson, Bolton Creek and Osage. At the time this report is written it is impossible to make any estimate of the saving made to the oil industry as the result of these supervising operations, but there is no doubt that a large saving will be effected, and it could easily exceed the expense of this entire Department during the biennial period.

During the past two years there has been a great deal less preventable waste of oil and gas than in the former biennial periods, due largely to the fact that the oil and gas operations are under State and Federal supervision, and also to the growing recognition on the part of the operating companies to the fact that prevention of waste is their best policy. If the history of the waste of oil and gas in prior years were fully known, the figures would be something staggering. For example, there is one gas well in the Big Horn Basin which is reported to have burned for a period of three years something like 50 million cubic feet of gas per day, having a fuel value of at least $5000.00 per day, in a community where gas could be utilized or, at current prices for gas in some of our larger cities, a value of possibly $25,000.00 per day. At $5000.00 per day, the loss in one year is estimated at $1,825,000.00, and in three years amounts to nearly 5½ million dollars, while, at the prices obtaining in some of the larger cities, this waste could have had a value of possibly 25 million dollars.

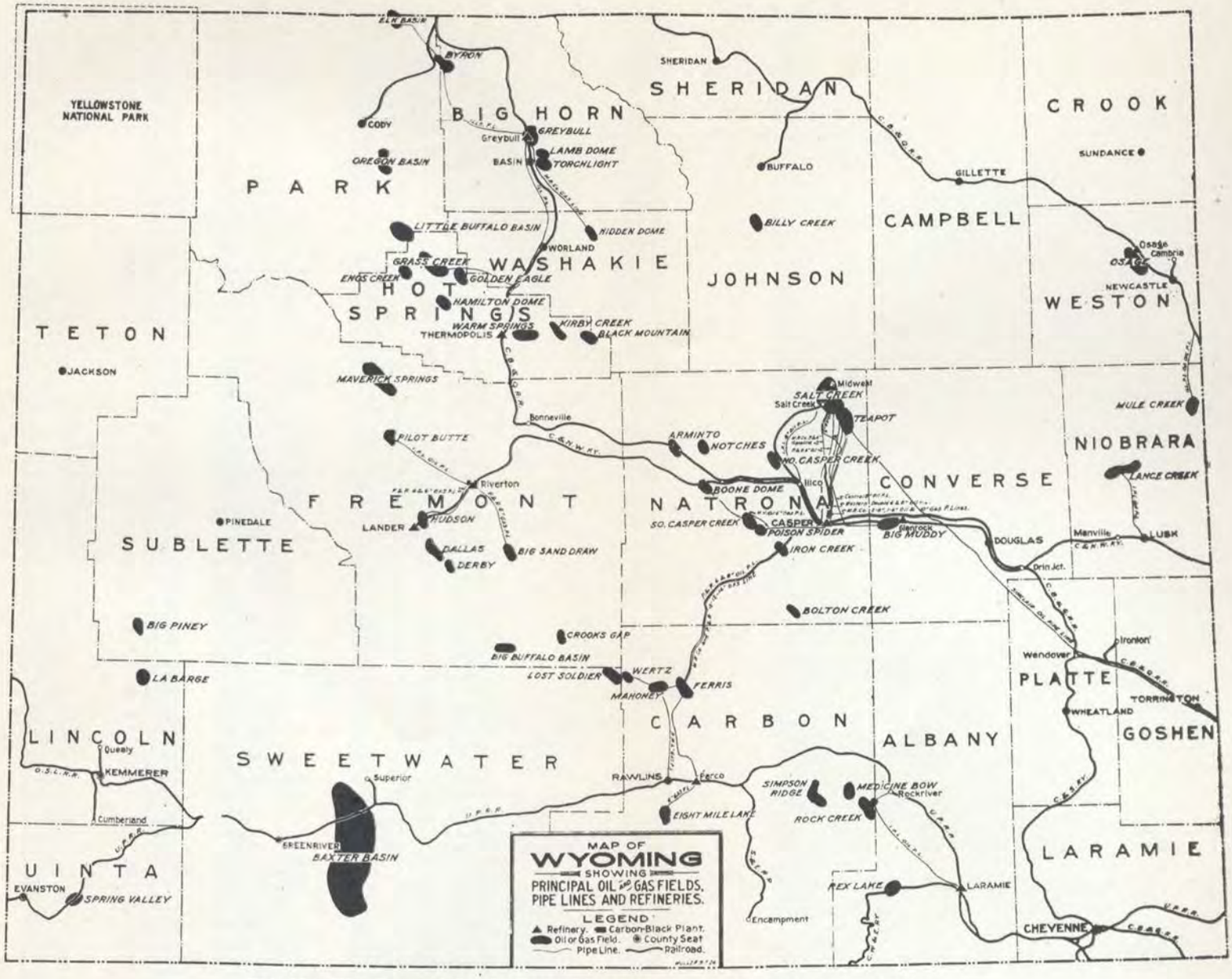
Another well in Big Horn Basin caught fire and burned for a year and a half and the estimated loss was anywhere from three million to fifteen million dollars, depending on what estimate is put on the value of this gas. The value of a Conservation Department in preventing such losses is at once apparent.

A few years ago, when a gas field was discovered a great many miles from the nearest town, it was a cause of great disappointment to the operators who had been drilling in the expectation of finding oil. At such a distance from consuming centers the gas was not considered to have any value and the

operator did not look far enough in the future to realize that Wyoming is a growing State and that before a great many years this gas could be used in the building up of prosperous communities and would yield the operators a pretty profitable return. Not having sufficient foresight to realize the opportunity of their discovery, they made no effort to control their gas. The well getting out of control it was allowed to blow into the air and, if it caught fire, little effort was made to extinguish it. This, of course, was not true in every case but that it did happen in several cases is a well known fact. In some cases gas wells were allowed to blow in the hope that they would turn to oil. This policy is not permitted by the present administration.

While there is still considerable waste of natural gas in Wyoming, practically all of this is a waste which cannot be prevented under present operating conditions and every effort is being made to reduce these wastes to an absolute minimum. The fact that the State has an Oil and Gas Conservation Department with inspectors continuing to make examinations of oil and gas wells in all parts of the State is a very favorable safeguard against such wastes. As an example of improvement in such conditions will be cited a gas well which accidently caught fire in the Lance Creek field in 1923 and which was extinguished by prompt methods after burning only about two weeks, which is quite different from the way gas wells were allowed to burn or blow several months at a time several years ago.

Owing to the increase in the activities required of the State Oil and Gas Inspectors, there has been tremendous increase during this biennium in the reports and inspections made by them. The activities of inspectors are briefly and partially set out in the following capitulations:



This Map Was Prepared by the Rocky Mountain Oil and Gas Producers Association

Work	Section	Field	Date	Character
Report	36-40-79	Salt Creek	May 1, '23	Ready to drill
Report	NE¼ 36-40-79 W	Salt Creek	May 1, '23	Grad'g-Preparing to Drill
Report	SW¼ 36-40-79 W	Salt Creek	May 1, '23	General conditions
Report	SE¼ 17-48-82	Billy Creek	May 3, '23	Gas (gen'l condition)
Report	SW¼ 16-48-82	Billy Creek	May 3, '23	Preparing to drill
Examination	36-46-63	Osage Field	May 6, '23	General condition
Examination	24-39-61	Mule Creek	May 6, '23	General condition
Examination	16-33-76	Big Muddy	May 8, '23	Production
Examination	16-44-62	State Land	May 16, '23	General conditions
Report	4-33-76	Big Muddy	May 23, '23	General conditions
Report	8-33-76	Big Muddy	May 23, '23	General conditions
Report	9-33-76	Big Muddy	May 23, '23	General conditions
Report	4-33-76	Big Muddy	May 23, '23	General conditions
Report	16-33-76	Big Muddy	May 24, '23	General conditions
Report	8-33-76	Big Muddy	May 24, '23	General conditions
Report	46-100	Enos Creek	June 13, '23	Production
Report	57-101	Enos Creek	June 13, '23	General conditions
Report	16-36	Enos Creek	June 13, '23	Report of ownership
Report	36-37-82	West Casper Cr.	June 15, '23	General conditions
Report	36-43-94	Warm Springs	June 17, '23	General conditions
Report	36-43-91	Warm Springs	June 17, '23	General conditions
Report	16-44-95	Warm Springs	June 17, '23	General conditions
Report	26-46-100	Enos Creek	June 17, '23	General conditions
Report	36-48-100	Buffalo Basin	June 17, '23	Production
Report	Town of Thermopolis		June 17, '23	Well drilling
Report	14-46-95	Neiber Dome	June 17, '23	Deep test
Report	42-90	Lysite Mountain	June 17, '23	Moving rig in
Report	51-92	Lamb Anticline	June 17, '23	Drilling
Report	51-92	Torchlight	June 17, '23	Pulling and plugging
Gen'l Ins	52-93	Greybull	June 17, '23	Plugging back
Gen'l Ins	52-91	Morris Dome	June 17, '23	Location made
Gen'l Ins	30-56-77	Garland Dome	June 17, '23	Location made
Gen'l Ins Lots	52-56-97	Garland Dome	June 17, '23	Rigging up
Gen'l Ins	51-100	Garland Dome	June 17, '23	General conditions
Gen'l Ins	48-90	Hidden Dome	June 17, '23	Gas
Gen'l Ins	51-90	Mercer Dome	June 17, '23	General conditions
Gen'l Ins	56-97	Byron Dome	June 17, '23	General conditions
Gen'l Ins	48-102	Pitchfork	June 17, '23	General conditions
Gen'l Ins	57-97	Sage Creek	June 17, '23	General conditions
Gen'l Ins	26-57-95	Morman Dome	June 17, '23	Drilling
Gen'l Ins	58-99	Elk Basin	June 17, '23	Drilling
Gen'l Ins	36-40-79	Salt Creek	June 20, '23	Cementing
Gen'l Ins	36-40-79	Salt Creek	June 20, '23	Cleaning
Gen'l Ins	NW¼ 36	Salt Creek	June 20, '23	Location made
Gen'l Ins	29-81	Bolton Creek	June 28, '23	Drilling
Gen'l Ins	21-48-82	Billy Creek	June 28, '23	Drilling
Report	31-50-69	Rozet Dome	June 30, '23	Rig up
Report	16-44-62	Skull Creek	June 30, '23	Cementing
Report	10-38-78	Salt Creek	June 30, '23	Drilling
Report	15-32-81	Goose Egg Anti.	July 9, '23	Drilling
Report	3-26-90	Lost Soldier Field	July 9, '23	Drilling
Report	36-44-93	Zimmerman Butte	July 21, '23	Drilling
Report	36-81	North Casper	July 21, '23	General conditions
Report	16-46-63	Osage Field	July 21, '23	Plugging and abandoning
Report	36-37-82	North Casper Cr.	July 18, '23	General conditions
Report	36-78	Salt Creek	July 19, '23	General conditions
Report	34-37-35	Powder River	July 20, '23	General conditions
Report	36-34-79	Salt Creek	July 27, '23	General conditions
Report	23-39-70	Miscellaneous	July 27, '23	Drilling
Report	29-81	Bolton Creek	Aug. 16, '23	General inspection
Report	46-63	Osage	Aug. 22, '23	General inspection
Report	36-46-63	Osage	Aug. 22, '23	General conditions
Report	16-46-63	Osage	Aug. 23, '23	Abandonm't and plugging
Report	36-47-63	Osage	Aug. 23, '23	General conditions
Report	5-25-87	Mahoney Dome	Sept. 5, '23	Drilling
Report	32-33-77W	Miscellaneous	Sept. 5, '23	Drilling
Report	16-32-77	Miscellaneous	Sept. 5, '23	Drilling
Report	32 & 33-77	Big Muddy	Sept. 6, '23	General conditions
Report	36-37-82	North Casper Cr.	Sept. 6, '23	Gas conditions
Report	30-90	Sweetwater	Sept. 12, '23	Mineral conditions
Report	36-34-79	Geary Anticline	Sept. 12, '23	General conditions
Report	36-37-82	North Casper	Sept. 22, '23	General conditions
Report	13-17-104	Miscellaneous	Oct. 10, '23	General conditions
Report	36-35-84	Pine Mountain Do.	Oct. 10, '23	General conditions
Report	32-36-65	Lance Creek	Oct. 31, '23	General conditions
Examination	16-48-82	Billy Creek	Nov. 9, '23	General conditions
Report	36-37-82	Miscellaneous	Nov. 17, '23	General conditions

Work	Section	Field	Date	Character
Report	16-42-79	Miscellaneous	Nov. 21, '23	General conditions
Report	36-34-76	Miscellaneous	Nov. 21, '23	General conditions
Report	28-36-64	Lance Creek	Nov. 24, '23	Producing
Report	5-35-65	Lance Creek	Nov. 24, '23	Producing
Report	27-36-65	Lance Creek	Nov. 24, '23	Producing
Report	27-36-65	Lance Creek	Nov. 24, '23	Producing
Report	33-36-65	Lance Creek	Nov. 24, '23	Producing
Report	5-35-65	Lance Creek	Nov. 24, '23	Producing
Report	28-36-65	Lance Creek	Nov. 24, '23	Drilling
Report	3-35-65	Lance Creek	Nov. 24, '23	Drilling
Report	8-35-65	Lance Creek	Nov. 24, '24	Drilling
Report	5-36-64	Lance Creek	Nov. 24, '24	Gas wells
Report	6-36-64	Lance Creek	Nov. 24, '24	Gas wells
Report	17-48-82	Billy Creek	Dec. 6, '24	Gas wells
Report	21-48-82	Billy Creek	Dec. 6, '24	Mudding off water
Report	16-48-82	Billy Creek	Dec. 6, '24	Drilling
Report	36-34-77	Miscellaneous	Dec. 6, '24	Coal report
Report	36-40-80	Miscellaneous	Dec. 19, '24	Oil and gas
Report	16-41-80	Miscellaneous	Dec. 19, '24	Drilling
Report	9-41-81	Miscellaneous	Dec. 19, '24	Drilling
Examination	24-52-81	Miscellaneous	Dec. 19, '24	General conditions
Report	36-40-61	Miscellaneous	Jan. 2, '24	Water conditions
Report	16-39-92	Miscellaneous	Jan. 2, '24	Mineral report
Report	32-58-77	Elk Basin	Jan. 12, '24	Report of leasing
Report	16-33-81	Emigrant Anti.	Jan. 15, '24	Water conditions
Examination	2-40-78	Salt Creek	Feb. 26, '24	General conditions
Examination	1-40-78	Salt Creek	Feb. 26, '24	General conditions
Examination	36-40-78	Salt Creek	Feb. 26, '24	General conditions
Examination	21-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	28-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	32-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	11-39-79	Salt Creek	Feb. 26, '24	General conditions
Examination	12-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	13-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	25-40-79	Salt Creek	Feb. 26, '24	General conditions
Examination	31-41-78	Salt Creek	Feb. 26, '24	General conditions
Examination	16-39-78	Salt Creek	Feb. 26, '24	General conditions
Examination	16-41-78	Salt Creek	Feb. 26, '24	General conditions
Examination	36-46-63	Osage Field	Feb. 26, '24	Rpt. of rent. pay. on lease
Report	36-81	North Casper Cr.	Mar. 13, '24	General conditions
Report	15-56-69	Miscellaneous	Mar. 15, '24	General conditions
Report	40-79	Salt Creek	Apr. 10, '24	Acreage in field
Report	33-56-97	Byron Field	Apr. 22, '24	General conditions
Report	36-81	North Casper	Apr. 25, '24	General conditions
Report	16-38-78	Salt Cr. Teapot Do.	Apr. 28, '24	Drilling
Report	33-56-79	Byron Field	Apr. 28, '24	General conditions
Report	16-38-78	Salt Creek	Apr. 29, '24	General conditions
Examination	36-40-61	Mule Creek	May 3, '24	General conditions
Report	36-81	North Casper Cr.	May 10, '24	General conditions
Report	33-56-97	Byron Field	May 10, '24	Rep. casing-cementing
Report	4-32-77	Big Muddy	May 17, '24	Drilling
Report	16-39-78	Salt Creek	May 27, '24	General report
Report	16-44-62	Miscellaneous	May 19, '24	General report
Examination	36-40-61	Mule Creek	May 21, '24	General report
Examination	36-31-61	Mule Creek	May 21, '24	General report
Examination	36-40-61	Mule Creek	May 21, '24	General report
Examination	31-40-60	Mule Creek	May 21, '24	General report
Examination	6-39-60	Mule Creek	May 21, '24	General report
Examination	36-45-63	Osage	May 21, '24	Drilling and abandonm't
Examination	16-44-62	Skull Creek	May 21, '24	Plugging
Examination	16-46-63	Osage Creek	May 24, '24	Report
Report	36-46-64	Osage Creek	May 24, '24	Production
Report	36-47-64	Osage Creek	May 24, '24	Production
Report	16-48-82	Billy Creek	May 24, '24	Drilling
Report	21-48-82	Billy Creek	May 24, '24	Drilling
Report	31-50-69	Rozet	May 24, '24	Drilling
Report	36-46-63	Osage	May 24, '24	Drilling
Report	36-37-82	North Casper Cr.	May 26, '24	Drilling
Report	36-40-79	Salt Creek	May 27, '24	Drilling
Report	36-37-82	North Casper Cr.	May 30, '24	Drilling
Report	36-37-82	North Casper Cr.	June 2, '24	General conditions
Report	31-47-63	Osage	June 4, '24	General conditions
Report	6-46-63	Osage	June 4, '24	General conditions
Report	17-42-95	Warm Sprgs. Ant.	June 13, '24	Drilling
Report	24-44-98	Hamilton Dome	June 13, '24	Producing
Report	36-43-94	Kirby Cr. Anti.	June 14, '24	Casing
Report	36-46-63	Otto Olsten Lease	June 23, '24	Production
Report	33-56-97	Byron Field	June 23, '24	Repairs

Work	Section	Field	Date	Character
Report	36-43-91	Warm Sprgs. Fld.	June 23, '24	Pulling casing-repairs
Report	3-42-93	Hale Dome	June 23, '24	Drilling
Report	24-51-93	Torch Light Fld.	June 24, '24	General inspection
Report	19-46-98	Grass Creek Fld.	June 24, '24	General inspection
Report	10-29-81	Bolton Creek Fld.	June 26, '24	General inspection
Report	36-36-81	North Casper Cr.	June 27, '24	General repairs
Report	33-76	Big Muddy Field	June 30, '24	General repairs
Report	29-81 W	Bolton Creek	July 14, '24	Plugging
Report	21-31-70 W	Miscellaneous	July 19, '24	Drilling
Report	33-55-97	Byron Field	July 19, '24	Gas operations
Report	33-56-97	Byron Field	Aug. 11, '24	Cementing and cleaning
Report	36-78-40	Salt Creek Field	July 30, '24	General inspection
Report	36-35-84	Pine Mountain	July 19, '24	General report
Report	.29-81	Bolton Creek Fld.	July 24, '24	General report
Report	36-92	Lance Creek Fld.	July 25, '24	General report
Report	36-40-61	Mule Creek Fld.	July 26, '24	General report
Report	36-36-81	North Casper Cr.	July 30, '24	Production
Examination	36-40-79	Salt Creek Fld.	Aug. 14, '24	Production
Examination	36-37-82	North Casper Cr.	Aug. 13, '24	Drilling
Examination 14, 23,	36-55-78	Miscellaneous	Aug. 22, '24	Coal production
Examination	36-55-79	Miscellaneous	Aug. 22, '24	Coal production
Examination	16-55-77	Miscellaneous	Aug. 22, '24	Coal production
Examination	16-50-73	Miscellaneous	Aug. 22, '24	Coal production
Examination	36-51-74	Miscellaneous	Aug. 22, '24	Coal production
Examination	36-50-68	Miscellaneous	Aug. 22, '24	Gravel
Examination	31-50-69	Miscellaneous	Aug. 22, '24	Shaley limestone
Report	8-57-87	Miscellaneous	Aug. 24, '24	Clay
Examination	16-54-83	Miscellaneous	Aug. 24, '24	Coal production
Examination		Bolton Creek	Aug. 25, '24	Plugging and abandoning
Examination	28-48-82	Billy Creek	Aug. 25, '24	Drilling
Examination	21-48-82	Billy Creek	Aug. 25, '24	Drilling
Examination	16-48-82	Billy Creek	Aug. 25, '24	Drilling
Examination 13 &	14, 34-84	Pine Moun. Dome	Aug. 28, '24	General conditions
Examination	16-46-63	Osage	Aug. 28, '24	General conditions
Examination	16-23-104	Miscellaneous	Aug. 30, '24	Mineral report
Examination	36-37-82	North Casper Cr.	Sept. 30, '24	General repairs
Examination	36-33-68	Miscellaneous	Sept. 10, '24	Mineral report (coal)
Examination	36-40-79	Salt Creek	Sept. 27, '24	Drilling
Examination		Osage	Sept. 27, '24	Olston analysis
Examination	29-81	Bolton Creek Fld.	Sept. 24, '24	General inspection
Examination	17-27N R95W	Buffalo Basin	June 4, '23	Production
Report	1-23-89W	Buffalo Basin	June 1, '23	Drilling
''	NE¼ NE¼ 12-28-93	Spring Creek	June 11, '23	
Report	12-28-93	Spring Creek	June 22, '23	Oil & gas (abandonm't)
Report	17-27-95	Buffalo Basin	June 25, '23	
Report	20-21-80	Simpson Ridge	June 25, '23	
Report	22-17-104	Baxter Basin	July 6, '23	
		Hudson Field	July 7, '23	
Report	36-37-94		July 9, '23	
Gen'l Ins	25-21-79	Medicine Bow	July 21, '23	Oil
Report	3-26-90	Lost Soldier	July 21, '23	Oil
Report	4-33-99W	Lander	July 21, '23	Drilling
Report	16-21-80		Aug. 8, '23	Drilling
Report	36-21-79		Aug. 8, '23	Drilling
Gen'l Ins	5 & 10-3-2E	Lander	Aug. 21, '23	Drilling
Gen'l Ins	2-25-87	Mahoney Dome	Sept. 14, '23	Drilling
Gen'l Ins	23-17-104	Baxter Basin	Sept. 11, '23	Drilling
Gen'l Ins	36-17-104	Baxter Basin	Sept. 11, '23	Drilling
Gen'l Ins	13-17-104	Baxter Basin	Sept. 11, '23	Drilling
Gen'l Ins	36-18-104	Baxter Basin	Sept. 11, '23	Drilling
Gen'l Ins	11-17-104	Baxter Basin	Sept. 11, '23	Drilling (deep test)
Gen'l Ins	22-16-104		Sept. 11, '23	Gas
Gen'l Ins	7-16-104		Sept. 13, '23	Rig up
Gen'l Ins	36-25-89	Sherrard		
	16-25-89	Sherrard		Rig up
	16-25-89	Sherrard		Rig up
	16-27-95	Buffalo Basin Do.		Drilling
	16-23-97	Red Desert		No development
	36-19-78	Rock Creek		No development
	36-20-78	8 Mile Lake		No development
	36-26-95	Lost Creek		No development
	36-22-87			Investigating
	15-27-101	Oregon Buttes		No development
	36-23-95	Red Desert		No development
	36-34-95	Alkali Butte Co.		No development

Work	Section	Field	Date	Character
	16-32-94	Burley Dome Co.		No development
	11-27-96	Buffalo Basin		No development
	36-27-95	Buffalo Basin		No development
Gen'l Ins	16-16-17	Rex Lake	Sept. 13, '23	No development
Gen'l Ins	22-41-91	Wilson Dome	Sept. 13, '23	No development
Gen'l Ins	36-26-87	Ferris Field	Sept. 13, '23	Production
Report	36-17-104	Baxter Basin	Sept. 14, '23	Repairing
Gen'l Ins	36-20-104	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	36-17-103	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-16-104	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-17-104	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-15-104	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	15-15-103	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-17-103	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-15-103	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	16-16-103	Baxter Basin	Sept. 14, '23	No development
Gen'l Ins	36-21-79	Baxter Basin	Oct. 8, '23	Production
Gen'l Ins	36-18-104	Baxter Basin	Nov. 7, '23	General conditions
Gen'l Ins	36-39-92	Baxter Basin	Nov. 7, '23	Operations
Gen'l Ins	4-33-99	Hudson Field	May 27, '24	Abandonment
Gen'l Ins	27-99	Warm Sprgs. Anti.		
Report	25-100	Warm Sprgs. Anti.	June 9, '24	Repair work
Report	10-26-97	Warm Sprgs. Anti.	June 7, '24	Test structure
Report	36-21-116	Lincoln	June 27, '24	Mineral report
Report	16-26-118	Lincoln	June 27, '24	Mineral report
Report	16-21-84	Carbon	June 27, '24	Mineral report
Report	36-14-119	Uinta County	July 1, '24	Mineral report
Report	36-21-88	Carbon County	July 1, '24	Mineral report
Report	36-23-81	Carbon County	July 1, '24	Mineral report
Gen'l Ins	16-27-95	Buffalo Basin	Aug. 30, '24	Operations
Gen'l Ins	3-26-113	LaBarge Field	Aug. 30, '24	Operations
Gen'l Ins	8-25-86	South Ferris Fld.	Sept. 4, '24	Abandonment
Gen'l Ins	4-33-99	Hudson Field	Sept. 5, '24	Testing and plugging
	9-29-81	Bolton Creek	Sept. 30, '24	Testing and plugging
Gen'l Ins		Schoonmaker Ls. Hudson Field	Sept. 16, '24	General inspection

During the biennium ending September 30, 1922 the number of inspections by the two inspectors was..... 96
during the two years ending September 30, 1924.....266
inspections were made, an increase of.....170
inspections, or 177%
of the inspections made during the preceding biennium.

The above tabulation does not include a large number of inspections made by the State Geologist, either alone or in company with one of the inspectors, and does not include other activities of the inspectors, such as conferences with operators, office and telephone calls, letters received and sent, well logs secured and filed, sundry notices passed on and other similar activities. It is evident from the tremendous increase in the work required of the oil and gas inspectors, that certain changes should be made in the arrangements. In the first place, the Legislature of 1923 appropriated enough money to provide the salary of one inspector during the entire year and the salary of the other inspector during only six months of the year. Owing to the great increase in the amount of work, it is very essential that the Legislature should provide sufficient salary to employ both inspectors during the entire year and also to provide a greater contingent expense to take care of the additional travelling expenses resulting from the increasd activities.

Another essential which is also coming to our attention is that of providing a suitable office for the oil and gas inspectors. Owing to the fact that most of the activities of these inspectors are either in the central part of the State or the northeastern, northwestern or southwestern parts, headquarters in Casper would be preferable to any other location. During the recent biennium one of the inspectors had his headquarters in Casper, another in Lander. After a careful inspection of the situation it is believed to be to the best interests of the State to locate both inspectors in Casper and rent office space for them. During the recent biennium Mr. Maghee had no office but through the courtesy of the United States Bureau of Mines received his mail in their care. A majority of the oil companies operating in Wyoming have Casper offices and if the two inspectors were both located in Casper and have a Casper office, it will greatly facilitate their work and furnish them with files where they can accumulate data necessary to their successful endeavors. The officials of the operating companies will also know where they can find the inspectors if necessary to call upon them. In view of the great importance of this work to the prosperity of the State and its rapid growth, we believe that the Legislature will recognize the importance of providing additional funds to allow us to carry out the activities in this manner.

The number of wells, drilling and producing on which the State Geologist receives monthly reports, is shown in the following tabulation, and a steady increase will be noted:

Wells on Which Monthly Reports Are Received for Dates Given

SUMMARY

	April 1st, 1923		April 1st, 1924		Sept. 30, 1924	
	Drilling	Producing	Drilling	Producing	Drilling	Producing
Baxter Basin	5	.....	5	1	2	.....
Billy Creek	1	1	3	.....	2	1
Big Muddy	3	2	4	.....	4	.....
Bolton Creek	.....	8	.....	8	6	6
Byron	.....	1	.....	1	.....	1
Bell Springs	1	1	2	.....	1	.....
Black Mtn.	1	.....	1	.....	1	.....
Elk Basin	3	6	.....	51	.....	52
Ferris	1	12	.....	.....	.....	.....
Grass Creek	23	6	4	62	.....	63
Greybull	.....	.....	.....	.....	1	.....
Hidden Dome	.....	.....	.....	.....	1	.....
Hudson	.....	.....	.....	.....	.....	2
Lost Soldier	1	35	2	3	.....	5
Lance Creek	1	3	.....	2	.....	2
Mahoney Dome	.....	.....	.....	1	.....	.....
North Casper	.....	.....	.....	.....	.....	.....
Osage	.....	2	.....	4	.....	2
Salt Creek	9	67	15	133	15	129
Simpson Ridge	.....	.....	4	1	.....	.....
Rex	.....	.....	.....	.....	2	.....
Rock Creek	3	4	.....	.....	.....	5
Total	52	148	40	267	35	268

In General

Beginning July 1, 1923 a daily record has been kept of the work and activities of the State Geologist's Office, the endeavor being to include as nearly as possible all of the activities. This record has been kept continuously and a comparison between the activities during the first three months during which the records were kept and the same three months during the year 1924 is given in the following tabulation:

July, August and September	1923	1924
Letters received	466	673
Letters sent out	620	639
Bulletins sent	210	224
Bulletins requested but not available	38	14
Telephone calls	33	141
Office calls	62	126
Field inspections	12	7
Reports to Commissioner	14	129
Approved intention to drill	19	43
Other sundry notices approved	7	100
Well logs filed	16	30
Monthly reports filed	123	85
Maps wanted but not available	30	15
Maps sent out	48	31

It will be observed from this tabulation that there is a considerable increase in the amount of work handled by the Office, and it is to be expected that further increases will occur during the next two years.

This Department desires to be of service to the people of the State of Wyoming in every possible way along geological lines and, in addition to other activities, is commencing to assemble data on the subject of water wells, with the hope of issuing a bulletin on this subject whenever the available information is complete enough to justify it. Wells drilled in testing prospective oil structures very often fail to encounter oil or gas in commercial quantities but usually encounter more or less water. In some cases this water is alkaline and not desirable for any purpose. Some wells encounter pure water in heavy artesian flows. Other wells encounter warm water which may or may not have value. An attempt will be made to collect data regarding these wells showing the location of the wells, the sands productive of water, their depth, quantity of water, and the character of the same. As many of these wells are drilled in localities where the water could be used for irrigation or for stock water, it is believed that the information when collected will be of considerable value.

Wyoming's most important mineral product at the present time is petroleum, the production now being largely the light oil which has a paraffine base and which is refined mainly into gasoline and kerosene with some lubricating oil and a number of by-products. It is believed that a majority of the light oil structures of Wyoming have been discovered and that, while the discovery of a few new fields will keep production for the next few years at somewhere near the present level, the production of light oil is sure to decline and other resources must be developed to keep production at its present value or increase it. One of these resources capable of production is the black oil which has an asphaltic base producing small amounts of gasoline and other products but having asphaltum for its principal constituent. Black oil in the past has not been profitable to the operators, except in rare cases, owing to its low market price and to the expense of producing it. It can be made profitable, however, if refined in this State and made into asphaltum and a number of other important by-products, it being essential to find a market for these products before their manufacture is undertaken. Asphaltum is far superior to any other product for paving purposes and every city in Wyoming intending to do paving should specify that same is to be done with Wyoming asphaltum. This will not only be a business-like

policy for the city but will give business and encouragement to an industry which will help to make Wyoming a prosperous State.

Another important product in which asphaltum is used is in prepared roofing. Wyoming contains all of the raw material necessary for the manufacture of prepared roofing and this industry should be encouraged in every possible way. In addition to the asphalt, roofing requires the use of such mineral products as crushed slate, sandstone, limestone, waste from asbestos mills, etc., and the development of this industry would result in the development of more than one of our natural mineral resources. Our State Highways should eventually be paved with asphalt. The gravel surfacing now being used is a great improvement over the former surfaces but there is no question that careful tests would demonstrate the fact that the excessive wear on tires from the sharp gravel and deterioration of mechanical parts of automobiles and trucks from bumps and inequalities cost the people of Wyoming more money per annum than would the interest and depreciation on asphalt surfaced highways. In addition, an asphalt highway can be travelled any day of the year in contrast to present conditions, when a number of our best highways are impassable after heavy storms. The greatest possible use of Wyoming asphalt is, therefore, highly recommended.

During the past season the State Geologist has been collecting data for the preparation of a bulletin and the oil and gas possibilities of Platte, Laramie and Goshen Counties. This has been in response to a large number of inquiries, not only from residents of the three counties who wish to know the possibilities of their own localities, but also from oil operators of Wyoming and from other states contemplating drilling operations. The discoveries of oil and gas in Northern Colorado, a short distance from the Wyoming line, have made it evident that oil bearing formations exist in the three counties mentioned, and there is considerable inquiry as to whether geological conditions indicate the possibility of commercial oil pools. This bulletin will be finished in the near future and will be distributed free of charge.

In this biennial report we are attempting to make a tabulation of all of the oil structures in Wyoming showing approximately the depth of the minor and main producing horizons, geological formations from which production is obtained, the productive areas, and naming the deepest horizons tested. Tabulation will include not only the productive fields but also those which have been tested and found to be unproductive, those which have been partially tested by wells not reaching the

deepest sands or not situated on the most favorable part of the structure, also those structures which have not been tested at all, giving, wherever possible, information as to whether the geological conditions are favorable or unfavorable. A big majority of the structures so tested were drilled before the laws required the filing of logs in this Office and in many cases the wells were drilled a number of years ago and it is impossible to get fully reliable information concerning them all, and there is no doubt that this tabulation will contain errors. It is to be hoped that oil producers, geologists and others discovering errors or omissions in this tabulation will advise the State Geologist to that effect, in order that this tabulation may be made fully and completely accurate as soon as possible, and co-operation of this nature will be greatly appreciated.

This Office has for free distribution a copy of the United States Geological Survey Map of 1921 showing the location of the oil and gas structures of Wyoming, including practically all of the structures mentioned in this tabulation. This map is on a reduced scale and is more convenient to carry than the Geological Survey Map and can be used in conjunction with this tabulation.

During the two year period covered by this report there have been additions to the productive areas of Wyoming, both oil and gas discoveries having been made. Discoveries of oil were made on the Medicine Bow structure, Simpson Ridge, Rex Lake and Black Mountain. At this time drilling has not progressed sufficiently to make any estimate of the importance of these four discoveries but it is safe to say that the Rex Lake discovery will result in a commercial field, while the status of the other three will have to be determined from the drilling now in progress. Discoveries of gas were made in the Billy Creek structure, Enos Lake, Allen Lake, Eight Mile structure, Teapot Dome and Buffalo Basin. With the possible exception of one, all of these discoveries of gas are believed to be of considerable commercial importance and will constitute a very substantial addition to the industrial development of Wyoming. Gas is by far the most economical of fuels and the discovery of these fields is certain to attract industrial development.

In this report will be found a number of tables and tabulations relative to the mineral and oil industries of the State, including the following:

List of publications of the State Geologist's Office.
List of oil refineries and natural gasoline plants in Wyoming.
List of pipe lines.
Tabulation of the mineral resources of Wyoming.
Mineral production of Wyoming for 1923.
Correlation table showing geological formations.
Tables relating to oil well casing, tanks, etc:

Conclusion

In conclusion we wish to call attention to the increase in the activities and accomplishments of this Department during the biennium period covered in this report. The mining industry, which has been going through a period of depression similar to that affecting agricultural and livestock interests, is beginning to revive and the mineral possibilities of Wyoming are attracting the attention of investors. It is important that this Department be prepared to furnish complete and reliable information regarding the undeveloped resources of this State, which are probably not exceeded by those of any other state in the Union. Information collected by this Office shows that the Geological Department of the State of Wyoming receives smaller appropriations for geological work and for the dissemination of information regarding minerals than almost any of the other states which are important producers of mineral products.

Wyoming is now the fourth state in the Union in the production of petroleum. It ranks sixth in the production of natural gas. The development of these resources in Wyoming during a period when financial conditions were unfavorable to almost every other line of endeavor has helped to keep the people of Wyoming in a fairly prosperous condition. The oil fields and cities at which refineries are located have furnished an excellent market for all sorts of livestock and agricultural products, which has been favorable to those who are able to market such products, and the immense amount of drilling and construction work in connection with the oil and gas development has furnished a market for labor, which has greatly reduced unemployment. As shown elsewhere in this report, the mineral production for Wyoming for the year 1923 amounts to the immense sum of $76,347,502.00, making it by far the most

important industry of the State and the chief source of revenue during the past two years.

It is realized, of course, that the livestock and agricultural industries of this State have been going through a very serious period of depression and that land owners have had great difficulty in endeavoring to pay their taxes, and that it is the desire of the Governor and the Legislature to keep expenses of the State Departments as low as possible. This Department has made every effort to accomplish the greatest amount of work for the least expenditure of money and will continue to follow this policy. To secure the maximum development of Wyoming resources would bring an immense amount of money into this State, which would be of great assistance to the agricultural interests, not only in contributing to the taxes and thus lowering taxes on agricultural property, but also in furnishing a good market for agricultural products and labor. It would, therefore, seem to be the truest economy to give adequate support to the Geological Department in its efforts to reduce preventable waste of oil and gas and to secure the development of Wyoming oil and mineral lands.

Mineral Production of Wyoming in 1923

(From the United States Geological Survey)

Product	1923	
	Quantity	Value
Clay, raw, short tons	614	$ 10,448
Coal, short tons	7,575,031	20,916,000
Copper, pounds	111,280	16,358
Gold, troy ounces	14	296
Gypsum, short tons	33,644	176,791
Iron ore, long tons	378,747	(b)
Mica, scrap, long tons	100	2,000
Natural gas, M cubic feet	(a) 23,427,000	(a) 3,031,000
Natural-gas gasoline, gallons	21,292,000	1,992,000
Petroleum, barrels	44,785,000	48,900,000
Platinum and allied metals, troy ounces	(b)	(b)
Phosphate rock, long tons	250	1,000
Sand and gravel, short tons	1,377,271	403,911
Silver, troy ounces	254	208
Stone, troy ounces	(c) 186,150	(c) 281,595
Lime, sodium sulphate, mineral waters and miscellaneous	.....	615,895
Total value, eliminating duplications	.....	$76,347,502

a. For the year 1922.
b. Value included under miscellaneous.
c. Exclusive of sandstone and miscellaneous stone, value for which is included under "Miscellaneous".

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 Alumna	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

Production of Crude Oil from Wyoming Fields in 1923 By Pipe Line Runs

Salt Creek	34,555,169
Byron	33,929
Lost Soldier	1,538,466
Lance and Mule Creeks	366,126
Osage	54,057
Dallas and Derby	71,378
Hudson Dome	58,654
Greybull	13,460
Ferris, Mahoney and Wertz	77,902
Hamilton Dome	197,784
South Casper Creek and Poison Spider	86,319
Warm Springs	6,576
Notches	48,092
Teapot	1,132,507
Pilot Butte	29,434
Big Muddy	632,376
Grass Creek	1,437,972
Elk Basin	646,780
Spring Valley	2,243
Rock River (estimate)	1,200,000

List of Publications

Albert B. Bartlett, 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.
*Bull. 1, Mineral Resources: Jamison, 1911.
*Bull. 7, Atlantic City Gold District: Trumbull, 1914.
Press Bull. 10, Mineral Resources: Morgan, Oct. 1, 1920.

*Out of Print.

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. 17, Bibliography and Index: 1918.
Bull. 18, Mining Laws—State and Federal: Morgan, 1921.
Map, State Topographic, 1000 ft. contour: Price $1.00.
Map, State Geologic: April 1, 1921.
Map, Wyo. Oil and Gas Fields, U. S. G. S. 1921.

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 Field: Jamison, 1912.
*Bull. 5, Prospective Oil Fields: Trumbull, 1913.
*Bull. 8, Salt Creek Oil Field: Trumbull, 1914.
*Bull. 10, Basin-Greybull Oil and Gas Fields: Hintze, 1915.
*Bull. 11, Pt. 1, Little Buffalo Basin Gas Field: Hintze.
Pt. 2, Grass Creek Oil & Gas Field: Hintze, 1915.
*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.

* Out of Print.

UNITED STATES BUREAU OF MINES, ROCKY MOUNTAIN PETROLEUM ASSN. TANK CAPACITIES

Where greater accuracy is required or the tank material is of considerable thickness, the actual **inside** circumference should be used and may be obtained from the strappings (outside measurements) by use of the following formula, in which let

OC = Outside circumference or strapping measurement in FEET
IC = Inside circumference of tank in FEET
t = Thickness of tank wall in INCHES
IC = OC-.5236t

Computations by: E. P. Campbell. Drawn by: E. K. Parks.

Capacities in Barrels Per Vertical Inch for Tanks of Various Circumferences

CIRCUMFERENCES—Tenths of Feet

Feet	0	1	2	3	4	5	6	7	8	9
18	.3826	.3869	.3912	.3955	.3998	.4040	.4086	.4130	.4174	.4220
19	.4263	.4309	.4354	.4399	.4445	.4492	.4537	.4583	.4630	.4678
20	.4724	.4772	.4819	.4868	.4915	.4964	.5012	.5061	.5109	.5158
21	.5208	.5258	.5308	.5359	.5408	.5458	.5510	.5562	.5613	.5664
22	.5716	.5768	.5820	.5873	.5926	.5979	.6032	.6086	.6139	.6195
23	.6248	.6302	.6357	.6418	.6467	.6521	.6578	.6634	.6690	.6747
24	.6802	.6861	.6917	.6974	.7031	.7088	.7147	.7205	.7264	.7323
25	.7381	.7441	.7500	.7559	.7619	.7679	.7740	.7800	.7861	.7922
26	.7983	.8045	.8107	.8169	.8231	.8292	.8356	.8419	.8482	.8546
27	.8609	.8673	.8738	.8802	.8866	.8931	.8996	.9060	.9127	.9193
28	.9259	.9324	.9392	.9459	.9526	.9593	.9660	.9729	.9796	.9863
29	.9932	1.0001	1.0070	1.0139	1.0208	1.0278	1.0348	1.0417	1.0488	1.0560
30	1.0629	1.0699	1.0771	1.0842	1.0914	1.0985	1.1058	1.1131	1.1203	1.1276
31	1.1349	1.1423	1.1496	1.1569	1.1644	1.1719	1.1793	1.1867	1.1943	1.2020
32	1.2093	1.2169	1.2245	1.2321	1.2398	1.2474	1.2551	1.2628	1.2705	1.2783
33	1.2861	1.2940	1.3018	1.3097	1.3175	1.3254	1.3333	1.3412	1.3492	1.3572
34	1.3652	1.3733	1.3814	1.3894	1.3975	1.4057	1.4139	1.4221	1.4302	1.4383
35	1.4467	1.4549	1.4633	1.4716	1.4800	1.4883	1.4968	1.5052	1.5136	1.5219
36	1.5305	1.5390	1.5477	1.5562	1.5648	1.5734	1.5820	1.5907	1.5994	1.6080
37	1.6168	1.6256	1.6343	1.6430	1.6519	1.6608	1.6697	1.6785	1.6874	1.6963
38	1.7053	1.7143	1.7235	1.7326	1.7414	1.7504	1.7595	1.7687	1.7779	1.7870
39	1.7962	1.8056	1.8148	1.8240	1.8334	1.8427	1.8520	1.8612	1.8707	1.8802
40	1.8896	1.8990	1.9086	1.9180	1.9276	1.9371	1.9467	1.9560	1.9659	1.9757
41	1.9852	1.9948	2.0047	2.0144	2.0242	2.0339	2.0438	2.0537	2.0635	2.0734
42	2.0833	2.0933	2.1033	2.1132	2.1232	2.1332	2.1432	2.1533	2.1634	2.1735
43	2.1837	2.1939	2.2040	2.2143	2.2245	2.2348	2.2450	2.2552	2.2656	2.2761
44	2.2864	2.2968	2.3072	2.3177	2.3282	2.3388	2.3492	2.3596	2.3703	2.3809
45	2.3915	2.4021	2.4128	2.4234	2.4342	2.4449	2.4557	2.4664	2.4774	2.4880
46	2.4990	2.5100	2.5208	2.5315	2.5426	2.5537	2.5646	2.5755	2.5867	2.5978
47	2.6089	2.6198	2.6311	2.6425	2.6534	2.6646	2.6759	2.6871	2.6984	2.7096
48	2.7210	2.7325	2.7438	2.7550	2.7666	2.7781	2.7895	2.8010	2.8125	2.8240
49	2.8356	2.8472	2.8589	2.8704	2.8821	2.8936	2.9054	2.9170	2.9289	2.9409
50	2.9525	2.9643	2.9762	2.9890	2.9999	3.0118	3.0238	3.0357	3.0477	3.0597

UNITED STATES BUREAU OF MINES, ROCKY MOUNTAIN PETROLEUM ASSN.
Collapsing Pressures and Capacities of Casing

Nominal Size	Weight Per Ft. With Collars	Actual Outside Diameter	Actual Inside Diameter	Thickness	Collapsing Pressure Per Square Inch	Equivalent Water Column	Water Col. With Safety Factor of 2	Capacity Per Linear Foot	Capacity Per Linear Foot	Capacity Per 100 Linear Feet
Inches	Pounds	Inches	Inches	Inches	Pounds	Feet	Feet	U. S Gallons	Cubic Feet	Barrels‡
4¼	16	4.750	4.082	.334	4,710	10,850	5,425	.6792	.0908	1.62
4½	9.5	4.750	4.364	.193	2,140	4,920	2,460	.7702	.1039	1.83
4½	13	5.000	4.506	.247	2,900	6,680	3,340	.8281	.1107	1.97
4½	15	5.000	4.424	.288	3,610	8.320	4.160	.7982	.1067	1.90
4¾*	8	5.000	4.696	.152	1,250	2,880	1,440	.8997	.1203	2.14
4¾	13	5.000	4.500	.250	2,950	6,790	3,395	.8262	.1104	1.97
4¾	15	5.000	4.408	.296	3,750	8,630	4,315	.7928	.1060	1.89
5†	16	5.250	4.648	.301	3,580	8,260	4,130	.8814	.1178	2.10
5 3-16†	13	5.500	5.044	.228	2,210	5,090	2,545	1.0380	.1388	2.47
5 3-16†	17	5.500	4.892	.304	3,400	7,840	3,922	.9764	.1305	2.32
5⅝	20	6.000	5.352	.324	3,290	7,580	3,790	1.1677	.1561	2.78
6¼†	13	6.625	6.257	.184	1,020	2,350	1,175	1.5973	.2135	3.80
6¼†	17	6.625	6.135	.245	1,820	4,190	2,095	1.5356	.2053	3.66
6¼	20	6.625	6.049	.288	2,380	5,480	2,740	1.4916	.1994	3.55
6¼	24	6.625	5.921	.352	3,220	7,420	3,710	1.4295	.1911	3.40
6¼	26	6.625	5.855	.385	3,650	8,410	4,205	1.3974	.1868	3.33
6¼	28	6.625	5.791	.417	4,070	9,380	4,690	1.3667	.1827	3.25
6⅝	17	7.000	6.538	.231	1,470	3,400	1,700	1.7440	.2331	4.15
6⅝	20	7.000	6.456	.272	1,980	4.560	2,280	1.6988	.2271	4.04
6⅝	24	7.000	6.336	.332	2,730	6,280	3,140	1.6379	.2190	3.90
6⅝	26	7.000	6.276	.362	3,100	7,140	3,570	1.6061	.2147	3.82
6⅝	28	7.000	6.214	.393	3,480	8,020	4,010	1.5739	.2104	3.75
6⅝	30	7.000	6.154	.423	3,850	8,870	4,435	1.5440	.2064	3.68
7⅝	26	8.000	7.386	.307	1,940	4,470	2,235	2.2240	.2973	5.30
8°	32	8.625	7.917	.354	2,170	5,000	2,500	2.5572	.3419	6.09
8¼	28	8.625	8.017	.304	1,670	3,850	1,925	2.6204	.3503	6.24
8¼	32	8.625	7.921	.352	2,150	4,950	2,475	2.5583	.3420	6.09
8¼	36	8.625	7.825	.400	2,630	6,060	3,030	2.4962	.3337	5.94
8¼	38	8.625	7.775	.425	2,880	6,640	3,320	2.4648	.3295	5.87
8¼	43	8.625	7.651	.487	3,510	8,090	4,045	2.3863	.3190	5.68
9⅝	33	10.000	9.384	.308	1,280	2,950	1,475	3.5899	.4799	8.55
10	40	10.750	10.054	.348	1,420	3,270	1,635	4.1210	.5509	9.81
10	45	10.750	9.960	.395	1,800	4,150	2,075	4.0440	.5406	9.63
10	48	10.750	9.902	.424	2,030	4,680	2,340	3.9976	.5344	9.52
10	54	10.750	9.784	.483	2,510	5.780	2,890	3.9026	.5217	9.29
11	47	11.750	11.000	.375	1,380	3,180	1,590	4.9334	.6595	11.74
11	60	11.750	10.772	.489	2,220	5,120	2,560	4.7307	.6324	11.26
11⅝	40	12.000	11.384	.308	840	1,940	970	5.2827	.7062	12.58
12½	40	13.000	12.438	.281	500	1,150	575	6.3083	.8433	15.02
12½	45	13.000	12.360	320	750	1,730	865	6.2298	.8328	14.83
12½	50	13.000	12.282	359	1,010	2,330	1,165	6.1497	.8221	14.64
12½	54	13.000	12.220	390	1,210	2,790	1,395	6.0869	.8137	14.49
13½	50	14.000	13.344	.328	640	1,470	735	7.2598	.9705	17.29
15½	70	16.000	15.198	.401	790	1,820	910	9.4150	1.2586	22.42
19 3-16	90	20.000	19.182	.409	430	980	490	15.012	2.0068	35.74

*=14 thread.
†=11½ thread.
°=8 thread drive pipe, unless otherwise indicated, pipe is 10 thread.
‡=1 U. S. gallon, 231 cubic inches; 42 U. S. gallons, 1 barrel.

LINEAR FEET OF SPACE BETWEEN CASINGS FILLED BY ONE SACK OF CEMENT WHEN SET.

INSIDE STRINGS		OUTSIDE STRINGS.																									
		5 3/16	5 3/8	6 1/4	6 1/4	6 1/4	6 1/4	6 1/4	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	7 5/8	8 1/4	8 1/4	8 1/4	8 1/4	8 1/4	8 1/4	9 5/8	10	10	10	10	10	Nom. Dia.
		17	20	17	20	24	26	28	17	20	24	26	28	30	26	24	28	32	36	38	43	33	35	40	45	48	54	Weight Pounds per foot
Nom. Dia.	Actual Outside Dia.	4.892	5.352	6.135	6.049	5.921	5.855	5.791	6.538	6.450	6.334	6.276	6.214	6.154	7.386	8.097	8.003	7.921	7.825	7.775	7.651	9.384	10.146	10.054	9.960	9.902	9.784	Actual Inside Dia.
4	4.25	3.4	19.1	10.3	10.9	11.9	12.4	13.0	8.2	8.5	9.1	9.5	9.8	10.2	5.5	4.2	4.4	4.5	4.7	4.8	5.0	2.9	2.4	2.4	2.5	2.5	2.6	
4 1/4	4.5		24.0	11.6	12.3	13.6	14.4	15.2	9.0	9.4	10.1	10.5	11.0	11.4	5.9	4.5	4.6	4.7	4.9	5.0	5.3	3.0	2.4	2.5	2.6	2.6	2.7	
4 1/2	4.75			13.4	14.4	16.1	17.2	18.4	10.0	10.5	11.5	12.0	12.6	13.2	6.3	4.7	4.8	5.0	5.2	5.3	5.6	3.1	2.5	2.6	2.6	2.7	2.8	
4 3/4	5.0			16.0	17.4	20.0	21.7	23.6	11.4	12.1	13.3	14.0	14.8	15.7	6.8	5.0	5.1	5.3	5.6	5.7	6.0	3.2	2.6	2.7	2.7	2.8	2.9	
5 3/16	5.5								16.1	17.6	20.3	22.1	24.1	26.5	8.3	5.7	5.9	6.2	6.5	6.7	7.1	3.4	2.8	2.8	2.9	3.0	3.1	
5 5/8	6.0														10.9	6.8	7.1	7.5	8.0	8.2	8.9	3.9	3.0	3.1	3.2	3.3	3.4	
6 1/4	6.625	NOMINAL DIAMETER 11	11 5/8	12 1/2	12 1/2	12 1/2	12 1/2	13 1/2	13 1/2	14 1/2						9.3	9.9	10.7	11.6	12.2	13.8	4.6	3.4	3.5	3.6	3.7	3.9	
6 5/8	7.0	WEIGHT POUNDS. 60	40	40	45	50	54	42	50	47						12.2	13.2	14.7	16.5	17.6	To Small.	5.2	3.7	3.9	4.0	4.1	4.3	
7 5/8	8.0	3.9	3.1	2.2	2.3	2.3	2.4															8.4	5.2	5.4	5.6	5.9	6.4	
8 1/4	8.625	4.8	3.7	2.5	2.6	2.6	2.7				NOMINAL DIAMETER 15 1/2	16 Hole	17 Hole	18 Hole	19 Hole	20 Hole	20						7.1	7.6	8.1	8.5	9.5	
9 5/8	10.0		6.8	3.7	3.8	4.0	4.1	2.5	2.6	1.9	WEIGHT POUNDS. 70						90											
10	10.75			5.2	5.4	5.7	6.0	3.1	3.2	2.2	1.7	1.4	1.2	.97	.82	.71	.80											
11	11.75							4.7	5.1	2.9	2.2	1.7	1.3	1.1	.90	.77	.88											
11 5/8	12.0							5.5	5.9	3.2	2.3	1.8	1.4	1.1	.93	.79	.90											
12 1/2	13.0									5.2	3.3	2.3	1.7	1.3	1.1	.87	1.0											
13 1/2	14.0										5.8	3.4	2.2	1.6	1.2	.99	1.2											
14 1/2	15.0												3.2	2.0	1.5	1.2	1.4											
15 1/2	16.0													3.0	1.9	1.4	1.8											

U.S. BUREAU OF MINES.
Petroleum Division

TABLE of CAPACITIES BETWEEN CASINGS.
by
Walter Drake.
Denver, Colo. June 1921.

This table is correct to the nearest tenth of a foot. Results are based upon the exact dimensions for inside and outside casings. In the computations 1.1 is used as the cubical content of one sack of cement when set. Diameters of casings are in inches.

UNITED STATES BUREAU OF MINES

Table showing the number of feet of casing or hole filled by one sack of cement or one barrel of mud fluid or water.

Results based upon the exact dimension of hole.

Compiled by Walter Drake, Expert Driller.

One sack cement equals 1.1 cubic feet. One barrel equals 5.615 cubic feet.

Nominal Size Casing	Weight Per Ft. With Collars	Capacity Per Linear Foot In Cubic Feet	Feet Filled By One Sack Cement	Feet Filled By One Barrel of Fluid
5 3-16	17	.1305	8.43	43.03
5 5/8	20	.1561	7.05	35.97
6 1/4	17	.2053	5.35	27.35
6 1/4	20	.1994	5.52	28.16
6 1/4	24	.1911	5.76	29.38
6 1/4	26	.1868	5.89	30.06
6 1/4	28	.1827	6.02	30.73
6 5/8	17	.2331	4.72	24.09
6 5/8	20	.2271	4.84	24.72
6 5/8	24	.2190	5.02	25.64
6 5/8	26	.2147	5.12	26.15
6 5/8	28	.2104	5.23	26.69
6 5/8	30	.2064	5.33	27.20
7 5/8	26	.2973	3.70	18.89
8 1/4	24	.3578	3.07	15.69
8 1/4	28	.3503	3.14	16.03
8 1/4	32	.3420	3.22	16.42
8 1/4	36	.3337	3.30	16.83
8 1/4	38	.3275	3.34	17.04
8 1/4	43	.3190	3.45	17.60
9 5/8	33	.4799	2.29	11.70
10	35	.5612	1.96	10.00
10	40	.5509	2.00	10.19
10	45	.5406	2.03	10.39
10	48	.5344	2.06	10.51
10	54	.5217	2.11	10.76
11	47	.6595	1.67	8.51
11	60	.6324	1.74	8.88
11 5/8	40	.7062	1.56	7.95
12 1/2	40	.8433	1.30	6.66
12 1/2	45	.8328	1.32	6.74
12 1/2	50	.8221	1.34	6.83
12 1/2	54	.8137	1.35	6.90
13 1/2	42	.9858	1.12	5.70
13 1/2	50	.9705	1.13	5.79
14 1/2	47	1.1332	0.97	4.95
15 1/2	70	1.2586	0.87	4.46
16	Hole	1.3953	0.79	4.02
17	Hole	1.575	0.70	3.57
18	Hole	1.766	0.62	3.18
19	Hole	1.968	0.56	2.85
20	90	2.005	0.55	2.80
20	Hole	2.180	0.50	2.58

OIL REFINERIES IN WYOMING

Name of Company	Location	Capacity Per Day
Midwest Refining (Std. Oil Co. of Ind.)	Casper	50,000 bbls.
Midwest Refining Co. (Std. Oil Co. of Ind.)	Greybull	12,000 bbls.
Midwest Refining Co. (Std. Oil Co. of Ind.)	Laramie	4,000 bbls.
Mutual Oil	Glenrock	3,000 bbls.
Alliance Oil & Refining	Thermopolis	1,500 bbls.
Riverton-Wyoming Refining	Riverton	2,000 bbls.
Wind River Refining	Lander	1,000 bbls.
Northwestern Oil Refining	Cowley	750 bbls.
General Petroleum Corporation	Lovell	500 bbls.
Wyatt Oil & Refining	Fetterman	500 bbls.
U. S. Oil & Refining	Osage	200 bbls.
McWhorter Oil & Refining	Lusk	200 bbls.
Osage-Upton Oil	Osage	100 bbls.
Clay Spur Refinery	Osage	100 bbls.
McAully Producers & Refiners	Upton	100 bbls.
Southwestern Oil	Thornton	50 bbls.
White Eagle	Casper	6,000 bbls.
The Texas Company	Casper	6,000 bbls.
Producers & Refiners Corporation	Grenville	6,000 bbls.
Total		94,000 bbls.

GASOLINE PLANTS IN WYOMING

Company	Location	Method	Gas Capacity Cu. Ft.	Approximate Yield Per Day—Gallons
Midwest Ref.	Salt Creek	Comp. 6 plants	43,000,000	60,000
Midwest Ref.	Elk Basin	Comp.	1,500,000	6,000
Carter	Salt Creek	Comp. & abs.	10,000,000	10,000
Ohio Oil	Grass Creek	Comp.	750,000	2,000
E. T. Williams	Salt Creek	Comp.	750,000	1,500
Wyo. Kans. Oil	Salt Creek	Abs.	500,000	1,000
Lovell Gasoline	Byron	Refrig.	3,000,000	1,500
Armstrong Co.	Rock Creek	Pressure Abs.	3,000,000	3,000
Producers & Ref.	Wertz	Natural Conden.		4,000
Producers & Ref.	Casper	Abs.	30,000,000	50,000
Producers & Ref.	Riverton	Abs.	6,000,000	3,000

PIPE LINES IN WYOMING

Company	Length	Size	From	To
Anglo United Oil Fields, Ltd.	5. mi.	4 in.	Derby Dome	Dallas
	11. mi.	6 in.	Dallas	Wyo. Pt.
Allen Oil Co.	9. mi.	3 in.	Byron	Lovell
Alliance Oil & Ref. Co.	6. mi.	6 in.	Warm Springs	Thermopolis
Bolton Oil Co.	32. mi.	6 in.	Bolton Creek	Casper
Central Pipe Line	36.5 mi.	8 in.	Salt Creek	Casper
Fremont Gas Co.	(12. mi.	6 in.)	Riverton	Lander
	(10. mi.	4 in.)		
Fremont Gas Co.	23. mi.	6 in.	Sand Draw	Riverton
Fargo Oil Co.	22.5 mi.	6 in.	So. Casper Creek	Casper
Gallatin Natural Gas	(3.72 mi.	8 in.)	Elk Basin	Billings, Mont.
(Gas Line)	(29.2 mi.	10 in.)		
General Petroleum	9. mi.	3 in.	Byron	Lovell
Illinois Pipe Line	21.43 mi.	8 in.	Big Muddy	Casper
Illinois Pipe Line	3. mi.	6 in.	Big Muddy	Glenrock
Illinois Pipe Line	49.35 mi.	8 in.	Grass Creek	Greybull
Illinois Pipe Line	29.16 mi.	6 in.	Grass Creek	Greybull
Illinois Pipe Line	63.39 mi.	6 in.	Elk Basin	Greybull
Illinois Pipe Line	7.58 mi.	6 in.	Rock Creek	Rock River
Illinois Pipe Line	25.55 mi.	6 in.	Lance Creek	Lusk
Illinois Pipe Line	14. mi.	3 in.	Mule Creek	Dakoming
Illinois Pipe Line	38.11 mi.	6 in.	Rock Creek	Laramie
Illinois Pipe Line	29. mi.	3 in.	Pilot Butte	Riverton
Illinois Pipe Line	13.9 mi.	6 in.	Hamilton Dome	Grass Creek
Illinois Pipe Line	6.2 mi.	3 in.	Osage	Clay Spur
Illinois Pipe Line	9.7 mi.	6 in.	Cowley Jct.	Cowley
Illinois Pipe Line	30. mi.	8 in.	Salt Creek	Illco
Illinois Pipe Line	14. mi.	8 in.	Illco	Casper
New York Oil	28.5 mi.	8 in.)		
(Gas Line)		10 in.)	Poison Spider	Casper
		12 in.)		
Lovell G. & E. (Gas Line)	8. mi.	5⅝ in.	Byron	Cowley
Midwest Refining	45. mi.	6 in.	Salt Creek	Casper
Midwest Refining	(26. mi.	8 in.)	Salt Creek	Casper
	(16. mi.	6 in.)		
Midwest Refining	45. mi.	6 in.	Salt Creek	Casper
Midwest Refining	8. mi.	3 in.	Torchlight	Greybull
Midwest Refining	7. mi.	2 in.	Notches	Lox
Midwest-Wyoming Gas (Gas Line)	35. mi.	8 in.	Hidden Dome	Greybull
Natrona Pipe Line	45. mi.	6 in.	Salt Creek	Casper
Ohio Oil Co.	28. mi.	4 in.	Grass Creek	Chatham
Occidental O. & G. Co. (Gas Line)	6. mi.	10 in.	Byron	Cowley
Producers & Ref. Corp.	52.42 mi.	6 in.	Lost Soldier	Ferris-Parco
Producers & Ref. Corp.	104.66 mi.	6 & 8 in.	Salt Creek	Casper-Ferris
Producers & Ref. Corp. (Gas Line)	14.93 mi.	6 in.	Baxter Basin	Rock Springs
Producers & Ref. Corp. (Gas Line)	22.78 mi.	6 in.	Big Sand Draw	Riverton
Producers & Ref. Corp. (Gas Line)	22.2 mi.	4 & 6 in.	Riverton	Lander
Producers & Ref. Corp. (Gas Line)	14.42 mi.	6 in.	Hatfield	Parco
Producers & Refiners Corp.	(18. mi.	10 in.)		
and Midwest Refining	(23. mi.	12 in.)	Lost Soldier	Casper
(Gas Line)	(48. mi.	14 in.)		
Rocky Mt. Nat. Gas	3½ mi.	6 in.		
	9. mi.	4 in.	Byron	Powell
Sinclair Pipe Line	49.6 mi.	8 in.	Teapot	Nebr. State Line
Sinclair Pipe Line	37.6 mi.	10 in.	Teapot	Nebr. State Line
Sinclair Pipe Line	75.6 mi.	12 in.	Teapot	Nebr. State Line
U. S. Oil & Refining	3. mi.	3 in.	Osage Field	Osage
Western Pipe Line Co.	(29. mi.	8 in.)	Salt Creek	Casper
	(14.8 mi.	6 in.)		

Tabulation of Wyoming Oil Structures

In the following order:

Big Horn Basin.

Central, Northeastern, and Southeastern Wyoming in alphabetical order.

Southwestern, Rawlins, Lost Soldier, Lander District, Laramie, Medicine Bow.

TABULATION OF OIL STRUCTURES BIG HORN BASIN

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Sheep Mountain					Madison	Madison	Open Anticline	Tested for Black Oil showing in Embar.
Shell Creek	Embar (Showing)				Morrison	Amsden	Dome	Tested through Amsden—unfavorable.
Cherry Creek					Sundance	Embar ?	Sharp Anticline Terraced	Test not thorough for Black Oil.
Morris					Chugwater		Sharp Mountain—Ward Fold	Favorable—to be drilled.
Greybull	Tensleep	Greybull	850 ft.	660 Acres	Mowry	Madison	Dome Favorable	Thoroughly tested to all sands—possible commercial production in Tensleep—Light Oil production in Greybull small and declining.
Lamb	Peay (Gas)	Greybull (Gas)	1,375 ft.	180 Acres	Cody Shale	Cloverly	Dome	Deep test drilling favorable for Black Oil at about 3,200 feet.
Torchlight		Peay, Och-Louie and Kimball	225 ft. to 450 ft.	800 Acres	Frontier	Greybull	Sharp Anticline	Light Oil production declining—deep test standing at 1,750 feet favorable for Black Oil at about 3,500 feet.
Potato Ridge					Cody Shale		Narrow Anticline	Deep test to be drilled.
Eight Mile Or Dry Dome					Cody Shale	Greybull	Dome	Frontier, Muddy and Cloverly Sands are water bearing—not favorable for deeper test.
Mercer					Sundance	Tensleep	Mountain—Ward Anticline	Unfavorable.
Paintrock					Sundance	Tensleep	Sharp Anticline	Test wells have proven possibilities to be unfavorable.
Manderson					Cody Shale	Greybull	Plunging Anticline	Unfavorable for further test.
Bonanza					Thermopolis Shale	Cloverly	Narrow Anticline	Wells drilled have not reached most likely sands—deep test drilling.
Zeisman					Tensleep		Sharp Anticline	Untested—Remote possibilities in Amsden and Madison.
Broken Back					Tensleep		Plunging Anticline	Untested—Remote possibilities in Amsden and Madison.
Nowood					Chugwater	Amsden	Sharp Anticline	Unfavorable.
Hidden Dome		Greybull ?			Mowry Shale ?		Terraced Anticlinal	Favorable for deep test—oil showings in Cloverly.
Sherrard	Frontier				Frontier	Greybull	Small Faulted Dome	Small production at 100 feet. Unfavorable for deeper test.
Tensleep					Torchlight	Thermopolis Shale ?	Sharp Anticline	Test well not favorable as to location and depth, structure promising.
Bud Kimball					Chugwater		Elongated Dome	Untested—Black Oil possibilities are favorable.
Morton					Cody Shale		Narrow Anticline	Structure small. Test 2,500 feet, possibly reach the Frontier.

TABULATION OF OIL STRUCTURES BIG HORN BASIN (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Mahogany Butte					Chugwater and Embar		Faulted Terraced Anticline	Faults across strike may effect accumulation possibilities for both Light and Black Oils.
Chabot					Mowry Shale		Faulted Anticline	Possible production in faulted area structure small and undrilled.
Lysite Mountain					Mowry Shale	Morrison	Sharp Anticline	Tested through all Cretaceous sands —results unfavorable.
Black Mountain		Embar	3,400 ft.		Mowry Shale	Embar	Narrow Anticline	Utah Refining drilling Amsden test well.
Lake Creek					Frontier	Greybull	Sharp Anticline	Drilled to Greybull, test off structure. Union drilling another test well.
Murphy	Frontier	Frontier (Gas)	1,600 ft.	Not Determined	Cody Shale	Frontier	Sharp Anticline	Test to lower sands justified, considering showing in Frontier. P. & R. rigging up deep test well.
Hale or Wildhorse Butte		Embar	1,200 ft.		Chugwater	Tensleep	Plunging Anticline	Deep test drilling by Union of California.
Blue Springs					Mowry Shale		Narrow Anticline	Favorable—titles in litigation.
Red Springs		Amsden	800 ft.		Embar	Amsden	Small Sharp Anticline	Oil found in Amsden of very low gravity and small amount.
Kirby Creek	Frontier (Oil)				Cody Shale	Mowry	Small Dome	Small production in Frontier—worthy of deep test.
Zimmerman Butte	Frontier (Gas)				Cody Shale	Cloverly	Sharp Anticline	Not thoroughly tested—deep tests drilling.
Warm Springs		Embar	1,000 ft.	320 Acres	Embar and Chugwater	Tensleep and Amsden	Domes on Anticline	Production small per well—pipe line to railroad—field shut in account present depression in market.
King					Chugwater	Embar	Dome	Tested to Embar. Lower sands doubtful producers.
Thermopolis Red Rose					Chugwater and Embar	Amsden	Dome	Tested for Black Oil, further exploration unfavorable.
Thermopolis Town					Chugwater	Tensleep	Dome ?	Well drilled in Town of Thermopolis is abandoned permanently.
Shelburne					Chugwater	Amsden	Open Anticline	Test well abandoned.
Lucerne					Morrison	Tensleep	Broad Anticline	Unfavorable.
Gebo					Cody Shale	Frontier	Broad Anticline	Favorable—untested to deep sands due to land title litigation.
Gyp Springs					Chugwater	Embar	Open Anticline	Open on mountainward side and unfavorable.
Richard					Chugwater	Madison ?	Sharp Anticline	Tested through all oil bearing formations.
Neiber					Fort Union	Base of Mesaverde	Broad Basinward Anticline	Tested by Midwest and abandoned.
Colter					Fort Union	Cody Shale	Anticlinal Nose Unfavorable	Test by Curtis, et al., abandoned—showing of oil at 2500 feet.

TABULATION OF OIL STRUCTURES BIG HORN BASIN (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Sand Draw					Cody Shale		Dome	Test well drilling.
Waugh					Cody Shale	Frontier	Sharp Plunging Anticline	Frontier found water-bearing—Lower sands doubtful.
Golden Eagle		Frontier (Gas)	2,700 Ft. to 3,000 Ft.	Not Determined	Lower Mesaverde	Frontier	Narrow Dome	Large gas production. Gas line to Thermopolis. 7 gas sands.
Mud Creek Dome					Chugwater		Dome	Doubtful
Kelly					Chugwater	Embar	Dome	Test to Embar found water—Lower sands unfavorable.
Duncan					Chugwater	Embar	Dome	Embar found water bearing.
Yankee					Thermopolis Shale	Sundance	Open Dome	Tested through Sundance unfavorable.
Embar					Embar		Eroded Anticline	Not favorable for test well.
Hamilton		Embar	2,400 Ft.	600 A.	Mowry Shale	Embar	Sharp Anticline	One well in red beds. Daily production about 500 bbl. black oil.
Brooks					Embar	Tensleep	Faulted Anticline	Not favorable as no closure evident—Drilled.
Wagonhound					Cody Shale	Greybull	Flat Narrow Anticline	Tested unfavorable through Greybull at about 1800 feet. Closure doubtful.
Grass Creek	Morrison (Oil)	Frontier (Oil & Gas)	800 Ft. to 1,000 Ft.	900 A.	Cody Shale	Tensleep	Narrow Anticline	Showing of black oil in Morrison—Tensleep big producer—Wells being deepened—Light oil production shallow and holding up well—One of best fields of state.
Enos Creek		Third Wall Creek (Gas)	2,800 Ft.	Not Determined	Cody Shale	Dakota	Sharp Anticline	Dakota tested and found dry—Well plugged back to gas production in Frontier.
Little Grass Creek		Frontier (Gas)		Not Determined	Cody Shale	Frontier	Dome	Gas well shut in—Capacity about 40,000,000 cu. ft.
Buffalo Basin		Frontier (Gas)	1,400 Ft.	Not Determined	Cody Shale	?	Domes on Anticline	Gas line to Grass Creek loop.
Gooseberry					Cody Shale	Mowry Shale	Domes on Anticline	Tested through Frontier—Unfavorably—Lower production doubtful.
Sunshine	Embar				Thermopolis Shale	Tensleep	Sharp Plunging Anticline	Tested through lower Cretaceous to Tensleep with showing of oil in Embar.
South Sunshine					Morrison		Dome	Untested and doubtful.
Four Bear					Mowry Shale	Embar ?	Sharp Anticline	Well drilled 1700 feet—Reached Embar? without obtaining oil or gas.
Pitchfork					Mowry Shale		Sharp Anticline	Well drilling doubtful.
Spring Creek					Mowry Shale	Chugwater	Narrow Anticline	Well drilled to 2310—probably reached base of Chugwater well drilling at 2800 ft.
Frost Ridge					Mesa Verde		Dome	Test to Frontier would be about 3500 ft.—Dome small.

TABULATION OF OIL STRUCTURES BIG HORN BASIN (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Oregon Basin		Cloverly Sands	1,300 Ft.	Not Determined	Frontier and Cody Shale	Morrison	Domes on Anticline Faulted	Deep test with rotary rig to test for oil below gas sands.
Shoshone					Frontier	Cloverly	Broad Anticline Favorable	Two wells drilling to test below Cloverly—Greybull expected at 1700 feet.
Cottonwood					Mowry	Morrison ?	Narrow Anticline	Test well drilled results unfavorable.
Skull Creek					Thermopolis Shale		Small Dome	Test well not deep enough.
Badger Basin					Mesa Verde		Broad Anticline	Probably 4500 feet to Frontier—closure doubtful on north west—not tested.
Elk Basin		Frontier (Oil) Greybull (Gas)	1,400 Ft. 2,400 Ft.	400 A.	Cody Shale	Greybull	Broad Faulted Anticline	One of ranking fields of state in light oil production—several favorable sands untested.
Little Pole Cat					Cody Shale	Mowry	Small Dome	Small gas well. Shut in at 3600 ft. Tested to 4400 ft.
Pole Cat	Frontier (Gas)				Cody Shale	Frontier	Structural Terrace	Small gas production in Frontier—should be tested to deeper sands.
Frannie					Cody Shale	Thermopolis ?	Narrow Anticline	Tested to 2400 ft. without favorable results.
Sage Creek					Cody Shale	Base of Cody	Sharp Anticline	Well drilled to 1800 ft. Not deep enough. Deep test drilling.
Garland	Peay (Oil)	Greybull (Gas)			Cody Shale	Morrison	Narrow Anticline	Gas going to Cowley. Deep test drilling by Royalty Holding Co.
Byron					Mesa Verde	Frontier ?	Faulted Anticline	One small gas well shut in—Three dry holes probably due to improper location—Well drilling by California Co.
Gyp Creek					Sundance	Embar ?	Sharp Anticline	Drilled to water in Embar?
Crooked Creek					Chugwater	Chugwater	Small Dome	Test well did not reach all possible saturated black oil sands.
Lovell					Mowry	Greybull	Elongated Anticline	Several test wells failed to get production to lowest sand tested the Greybull at 1200 ft.
Ionia					Frontier	Chugwater	Small Dome Doubtful	Test well drilled to base of Chugwater.
Little Sheep Mountain					Tensleep	Madison	Eroded Anticline	Tested to all possible producing sands.
Alkali	Tensleep		2,000 Ft.		Morrison	Amsden	Sharp Anticline	Test well drilled through Tensleep possibly not thorough due to water in well from lower sand.
Spence	Embar		500 Ft.	Not Determined	Chugwater	Embar	Narrow Anticline	Small wells in Embar.
Crystal Creek		Tensleep	800 Ft.	Not Determined	Chugwater	Tensleep	Sharp Anticline	Small wells in Embar and Tensleep not producing.

TABULATION OF OIL STRUCTURES—Central, Northeastern and Southeastern Wyoming in Alphabetical Order

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Alcova					Carlisle Shale	Tensleep 2,410 Ft.	Pitching Anticline	Hole drilled to 2,410 in Sec. 31-30-81—Dry—Not favorable.
Arminto 18-37-86					Pierre	Third Wall Creek 2,008 Ft.	Dome	Some gas found in 3rd Wall Creek Sand ? at 2,008 ft.
Arvada					Tertiary		Tertiary Dome ?	No tests have been drilled although the C., B. & Q. got gas enough to run a small engine.
Burris Dome 28-42-79					Pierre	Shannon 1,300 Ft. Barren	Monocline Sealed on North, South and West By Faults	Drilling at 1,320 ft.—intend to drill 5,000 ft. if necessary.
Bolton Creek	Sundance 1050 (Oil)	Stray ? Sand in Red Beds	2,050 Ft. (Oil)	640 A.	Mowry Shale	Tensleep 2,530 Ft.	Sharp Anticline	Produces oil—pipe line to field.
Boone Dome	Shannon 1,695 Small Am't. (Gas)	Wall Creek (Gas)	2,190 Ft. (Gas)	600 A.	Parkman	Dakota 4,800 Ft.	Dome	Deep-test drilling at 4,800 ft. with core drill.
Billy Creek		Wall Creek (Gas)	3,000 Ft.	1,000 A.	Pierre	Muddy 4,200 Barren	Dome	Heavy gas in Wall Creek Sand at 3,000 ft.
Big Muddy	Shannon 1,000 Ft. (Oil)	Wall Creeks (Oil)	3,100 Ft. +	2,500 A.	Pierre	Dakota	Dome	Producing oil.
Big Sulphur Springs T. 37 & 38, Rg. 83-84					Carlisle Shale	Wall Creeks 2,000 Ft. Barren	Anticline Faulted	Well drilled to 2,000 ft. on Sec. 31-38-80. Some gas in shale above Wall Creek.
Bull Creek Tps. 57-58 Range 62					Benton Shale		Dome	Drilling at 500 ft.
Bates Park 23-29-81					Morrison	Sundance 1,965 Ft. (Water)	Plunging Anticline	This well was not located correctly and another test should be drilled.
Bodie 33-31-80					Thermopolis Shale	Embar 2,165 Ft. (Water)	Plunging Anticline	Not favorable.
Butte Field Near Moorcroft, Wyo.		Dakota	300 Ft.		Cloverly	Dakota 300 Ft.	Monocline	Produces some oil in a few wells which have been drilled.
Beaver Creek						Lakota (Water)		
Brenning Basin or Douglas Field		Shales	300 Ft. to 1,000 Ft.		White River	Pierre 1,705 Ft.	Monocline Unconformity	About 40 wells drilled getting oil and gas in small amounts.
Clark Dome T. 31, R. 81					Niobrara		Plunging Anticline	Closure very small—not very favorable.
Colony					Thermopolis Shale	Tensleep 2,290 Ft. (Water)	Dome	Drilled by Roxanna—may not be fully tested.
Coal Creek 27-35-77					Niobrara	Muddy Sand 1,555 Ft. (Dry)	Dome	Well drilled to 2,340 ft.—abandoned—dry.

TABULATION OF OIL STRUCTURES—Central, Northeastern and Southeastern Wyoming in Alphabetical Order (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Castle Creek 36-38-81					Niobrara	Third Wall Creek (Barren) 2,620 Ft.	Anticline	Drilled to 2,625 ft.
Casper Dome 23-33-79					Pierre	First Wall Creek 2,930 Ft.	Faulted Monocline	Drilling objective Wall Creeks.
Dutton Basin 24-33-90					Chugwater	Amsden 1,750 Ft. (Barren)	Dome Faulted	Myers Pet. drilling
Dewey 36-42-60					Niobrara Shale	Lakota 3,636 Ft. (Barren)	Dome	3 wells drilled by Carter Oil Co.—no production.
Emmigrant Gap 9-34-82					Mowry Shale	Amsden 3,319 Ft. (Water)	Sharp Dome Faulted	Several tests drilled on this structure—all unproductive.
Freeland 34-31-80					Chugwater		Plunging Anticline	Faulted—not tested and not favorable
Fiddler Creek (Near Upton, Wyo.)					Pierre	Dome		Hole drilling at 2,850 ft.
Goose Egg T. 32, R. 81					Chugwater		Plunging Anticline	Test started—never completed.
Gothberg					Pierre Shale	First Wall Creek 1,200 Ft. (Water)	Dome	Not fully tested.
Glenrock South of 33-75						Dakota (Dry)		Drilled to Dakota—no more information.
Graybeal 23-29-81					Pierre	Sundance 2,882 Ft. (Dry)	Dome	Not favorable.
Geary Dome 32-34-77					Teapot	First Wall Creek Sand 4,897 Ft. (Dry)	Dome	Drilled by Inland Oil Co. to 4,897 ft. and abandoned.
Gose Dome 28-47-65					Pierre		Dome	Drilling at 3,300 ft.
Government Hill 31-40-80					Frontier	Dakota 1,500 Ft. (Water)	Plunging Anticline	Drilling at 1,700 ft.
Harney Creek 35-34-67								Well drilled to 2,996 ft.—dry—abandoned.
Indian Creek 35-35-61								Hole drilled to 2,340 ft. and abandoned—dry.
Irvine 21-31-70					Fox Hills	First Wall Creek 2,000 Ft. (Water)	Dome	Drilling—show of gas at 1,760 ft.
Iron Creek T. 32, R. 83		Sundance	1,431 Ft.	800 A.	Carlisle Shale	Sundance 1,436 Ft.	Sharp Dome	Produces oil and gas.
Kaycee 4-43-82				Morrison	Tensleep 2,530 Ft. (Water)	Dome		Not favorable.

TABULATION OF OIL STRUCTURES—Central, Northeastern and Southeastern Wyoming in Alphabetical Order (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Lance Creek		Dakota ? Sand A Sand B	3,465 Ft. 3,965 Ft.	3,000 A.	Pierre	"A" Sand 3,965 Ft.	Dome	Produces oil and gas.
La Prelle 10-32-72								Well drilled to 3,200 ft.
Lux Dome 35-37-86		Third Wall Creek	2,601 Ft. (Gas)		Pierre	Third Wall Creek 2,601 Ft.	Dome	Produces about 2 million gas.
Mule Creek		Lakota	1,336 Ft.	1,000 A.	Carlisle	Lakota 1,337 Ft.	Sharp Anticline	Produces heavy oil.
Moorcroft 25-52-67					Dakota	Madison Lime 2,102 Ft.	Dome	No oil.
Midway 21-35-79					Fox Hills	Second Wall Creek 4,822 Ft.	Dome	Drilled to 4,822—dry.
Notches		Tensleep	2,775 Ft.		Frontier	Tensleep 2,775 Ft. (Oil)	Sharp Anticline	Produces oil from Tensleep.
Near Newcastle 6-44-61					Niobrara			Well drilled to 2,055 ft. and abandoned.
Natrona T. 37, R. 83					Carlisle	Cloverly 1,615 Ft.	Dome	Not favorable.
Newcastle-Salt Creek Structure 10-45-61								Drilling at 240 ft.
Old Woman Creek					Morrison	Minnelusa 2,110 Ft. (Some Oil)	Anticline	Hole drilled to 2,110 ft.—found considerable oil.
Oil Mountain 35-35-84					Dakota	Embar 3,200 Ft.	Dome Faulted	Well drilled to 3,200 ft.—water.
Osage	Mowry Shale 150 Ft. to 3,000 Ft.	Newcastle Sand	1,200 Ft.	5,000 A.	Graneros Shale	Minnelusa 2,375 Ft. (Dry)	Terrace	Deep well drilled in Sec. 28-47-64—shallow wells—have small production.
North Casper Creek					Carlisle Shale	Sundance (Water)	Large Dome	Some gas at 986 ft.—drilling at 2,325 ft. Favorable.
Poison Spider 33-83		Sundance (Gas)	1,400 Ft.	1,200 A.	Cody Shale	Tensleep 3,366 Ft. (Oil)	Dome	Produces gas and black oil.
Pump Creek					Morrison		Dome	Not tested—rig standing.
Pat O'Conner Ranch 27-42-81					Pierre		Faulted Monocline	Drilling at 2,213 ft.
Powder River Station 25-36-85					Frontier		Dome	Well drilling—some gas found in Wall Creeks.
Pine Mountain	Embar	Tensleep (Gas & Oil)	1,822 Ft.		Dakota	Amsden 2,315 Ft.	Faulted Dome	Some gas and oil produced—not yet commercial.

Error

TABULATION OF OIL STRUCTURES—Central, Northeastern and Southeastern Wyoming in Alphabetical Order (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Rawhide-Lingle					Tertiary		Slight Doming in Tertiary	Two wells drilling—one probably in Pierre at 1,500 ft.
Rozet					Tertiary		Dome	Drilling at 1,600 ft.
Rocky Point Tp. 55 to 57 R. 67 to 69					Pierre		Plunging Anticline	Rig standing built in 1921. Favorable.
Rocky Ford Creek 52-61					Chugwater	Minnelusa	Anticline	Two wells drilling—no oil.
Red Fork					Morrison		Anticline	Not tested.
South Casper Creek		Sundance	1,460 Ft.	1,280 A.	Cody Shale	Tensleep 3,030 Ft. (Dry)	Dome	Producing gas and black oil.
Salt Creek	Shale Third Wall Creek Shannon	First Wall Creek Second Wall Creek Lakota	1,800 Ft. 2,200 Ft. 2,530 Ft.	22,000 A.	Steele Shale	Sundance 3,680 Ft. (Water)	Dome	Gas and oil. One of the most important fields in the world.
Steel Creek 17-46-82					Pierre	Second Wall Creek 2,720 Ft. (Gas)	Dome	Drilling at 2,800 ft.
Spindle Top 32-30-81		Stray Sand	2,300 Ft.		Mowry	Tensleep 2,700 Ft. (Water)	Faulted Dome	Not being produced.
Skull Creek 16-44-62					Niobrara	Lakota 3,692 Ft. (Water)	Dome	Abandoned—3,692 ft.
Stockade Beaver 6-42-61					Pierre	Newcastle 2,738 Ft.	Dome	Show of gas 2,738 ft.—abandoned.
Schnoor 30-29-81					Wall Creek	Sundance 2,485 Ft.	Plunging Dome	Well drilling
Tisdale Dome 24-41-81					Lakota	Tensleep 1,944 Ft. (Water)	Dome	Test drilling.
Thornton					Morrison	Amsden 2,505 Ft.	Dome	Well drilled to 2,505 ft.—water.
Teapot Dome	Shale Third Wall Creek	First Wall Creek Second Wall Creek	2,600 Ft. 3,000 Ft.	3,600 A.	Shannon	Third Wall Creek (Oil) 3,225 Ft.	Dome Faulted	Gas and oil.
Upton 3-47-65					Mowry	Muddy 360 Ft. (Water)	Dome	Not favorable.
Upton-Thornton					Carlisle Shale	Carlisle Shale 400 Ft.	Dome Shaped Uplift	Oil in shale—not commercial.
Wakeman		Shale Carlisle	300 Ft.			Supposed to be Wall Creek	Dome Shaped Uplift	Oil in Carlisle shale—a small amount.
Wallace Creek 15-34-87					Tertiary Parkman		Dome	Test well drilling. Gas found in shale at 2,700 ft.

TABULATION OF OIL STRUCTURES—Central, Northeastern and Southeastern Wyoming in Alphabetical Order (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Glendo T. 29-67					Chugwater		Monocline or Plunging Anticline	Drilling at 1,200 ft. in Chugwater.
Goshen 9-22-61					Laramie	Dakota ?	Doubtful	Abandoned. Further investigation of Goshen Hole area might be justified.
Guernsey T. 27-66					Tertiary		Tertiary	Drilling at 1,660 ft.
Horse Creek T. 17-70					Pierre	?	Open ? Anticline	Abandoned. May be tested again.
Jordan T. 19-69					Niobrara	Morrison ? 857 Ft.	Small Fold	Abandoned.
Meriden T. 20-62					Brule Tertiary	?	No Structure	Abandoned at about 1,500 ft.
Wheatland Antelope Gap					Tertiary		Dome in Tertiary	Untested. A good tertiary structure.

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Spring Valley	1st and 2nd Aspen (Muddy)	3rd Aspen (Muddy)	600 Ft.	640 A.	Knight (Tertiary)	Bear River (Dakota)	Monocline Favorable	All Aspen Sands appear to be saturated, tight sands, porosity low. Bear River productive, but practically untested.
Evanston					Evanston (Tertiary)		Plunging Anticline Doubtful	Closure doubtful, deep drilling.
Bear River					Beckwith		Sharp Anticline Unfavorable	Only possibilities lie in Carboniferous Sands.
Bridger Creek					Twin Creek Jurassic		Broad Anticline Doubtful	Black Oil Sands only possibilities, closure doubtful.
Fossil	Wasatch	Hilliard	400 Ft.	80 A.	Basal Tertiary	Sand Lenses in Hilliard	Faulted Anticline	Heavy dark lubricating oil found in sand at 250 feet. High grade paraffin base oil found 200 feet lower, undoubtedly coming from Cretaceous rocks, migrating up the fault to the west. Possibilities for large production in Cretaceous at 4,000? Wells drilling to shallow sands.
Cumberland					Frontier	Beckwith	Sharp Faulted Anticline Doubtful	Well drilling by G. C. Coneer.
Meridian					Beckwith		Sharp Anticline Favorable	Good possibilities for Black Oil.
Fontenelle					Adaville		Sharp Faulted Anticline Doubtful	Fair possibilities for commercial production in Carboniferous.
Wyoming					Hilliard		Sharp Faulted Anticline Doubtful	Several wells drilled in poor locations structurally.
Blank					Beckwith		Open Faulted Anticline	Unfavorable.
La Barge	Sand Lenses in Hilliard	Hilliard	600 Ft.	640 A.	Almy and Adaville with Knight Overlying Unconformably	Hilliard Sands	Sharp Faulted Anticline Favorable	Production found in shallow sands, oil migratory from more heavy saturation in deeper sands, structure badly faulted. Present development confined to shallow sands. Deeper Cretaceous Sands favorable for large production.
Seep Ridge					Almy		Narrow Sharp Anticline Favorable	East Anticline in Double Fold of which LaBarge is a part but not directly connected geologically. Should be tested thoroughly.
Kale					Knight and Almy		Narrow Sharp Anticline Favorable	East and north of the Labarge Anticline crests of both structures about 1 mile apart should be thoroughly tested.
Big Piney or Dry Piney	Sand Lenses in Hilliard	Hilliard	1,000 Ft.	800 ?	Knight Unconformable on Hilliard	Hilliard Sands	Sharp Cretaceous Anticline Favorable	Produces high grade oil from shallow depth. Will no doubt be tested through Cretaceous this year (1925).

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Willow Creek, Freedom, Afton, Etna, McAdoo, Smoot and Tygee Domes					Twin Creek Jurassic	Embar on Afton Dome Morrison on Tygee Dome	Sharp Anticlines Doubtful	One well drilled on Afton Dome to Embar at 1,200 ft. Well drilling on Tygee Dome. Rock Salt Bed found at 650 ft. Carboniferous beds only possibilities.
Eden					Wasatch Tertiary		Broad Anticlinal Arch Doubtful	Dips low, centering in small area at a point about 6 miles west of Eden postoffice. Deep test necessary to reach Cretaceous.
Baxter Basin		Second Wall Creek (Gas)	2,600 Ft.	Not Determined	Baxter Shale Member of of Hilliard	Dakota	Broad Anticline Favorable	Large gas production in Frontier. Dakota barren. Structure favorable for deep test at other points.
Hiawatha					Green River Tertiary		Broad Tertiary Anticline Favorable	Presence of Asphaltum oil seeps indicates possibility of discovering new productive horizons in Wyoming Tertiary.
Oregon Buttes					Cathedral Bluffs Wasatch Tertiary		Dome Doubtful	Cretaceous Sands to deep unless unconformity present at base of Tertiary.
Cherokee Ridge					Laney Shale Wasatch Tertiary		Sharp Faulted Anticline Doubtful	Too deep for present development methods.
Wamsutter					Bridger Upper Tertiary		Low Anticlinal Arch Doubtful	Too deep for present development methods.
Red Desert					Wasatch Tertiary		Broad Anticline Doubtful	Drilling.
Bear Creek					Wasatch Tertiary		Broad Anticline ? Doubtful	Drilling.
Horsetrack					Adaville	Hilliard	Anticline Unfavorable	Test drilled by Associated Oil Co. found glacial boulders.
Pickett Lake					Benton	Frontier	Sharp Anticline Doubtful	Well drilling found showing of oil and gas in First ? Wall Creek Sand.
Buffalo Basin	1st, 2nd & 3rd Wall Creeks	1st Wall Creek	603	Not Determined	Benton	Dakota	Several Small Domes Favorable	Prairie drilling several tests to prove presence and location of Domes—large gas well in Frontier show of oil in Mowry.
Lost Creek					Steele Shale		Sharp Anticline Favorable	Untested.
Crooks Gap					Steele Shale	Frontier	Sharp Anticline Favorable	Wells drilling.
Spring Creek					Niobrara	Mowry	Sharp Faulted Anticline Favorable	Cliff Pet. struck heavy gas flow at 1,200 ft. in what appears to be First Wall Creek.
Sheep Creek					Chugwater	Base of Chugwater	Faulted Dome Favorable	Well drilled off structure.
Lost Soldier	Several Sands Produce Small Quantities of Oil Above Dakota	Dakota	About 1,200 Ft. on Apex of Dome	Frontier Sands, 160 A. Mowry Sands 680 A. Dakota, 1,200 A.	Niobrara	Dakota	Dome	All sands, including sandy shales, from Frontier to Dakota, found productive. Potential production about 12,000 bbls. daily. Actual production about 4,500 bbls. Closure about 3,000 ft. Limits of Dakota pool not proven.

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Wertz	Mowry Sand Lens (Oil)	Dakota (Gas)	3,400 Ft.	Not Determined	Steele Shale	Dakota	Dome	Producing oil between casings from Mowry Shale, wet gas from Dakota supplies about 100 bbls. gasoline per day from drips gas line to Casper.
Mahoney		Dakota (Gas)	2,200 Ft.	Not Determined	Steele Shale	Dakota	Dome	Small oil production found below gas cap in Dakota Sand. Gas wells average about 30,000,000 cu. ft.
Ferris	Mowry (Oil)	Dakota (Gas)	1,800 Ft.	Small	Niobrara	Sundance ?	Dome	Gas production first developed from Dakota. Oil being taken in small quantity from Mowry.
G. P. Dome		Sandy Shale at Base of Steele Shale	3,200 Ft.	160 A.	Steele	Frontier ?	Plunging Anticline	Small production found at base of Steele Shale. Well drilling to test deep sands.
O'Brien Springs	Frontier (Gas)				Steele		Faulted Anticline	Wells to test Dakota uncompleted. Gas showing in Frontier.
Barren Meadows	Frontier (Gas)				Steele	Frontier	Anticline ?	Armstrong et. al. drilling.
Sherrard					Steele	Frontier	Sharp Anticline	Well being drilled by Good et. al. P. & R.—well abandoned.
Bailey					Steele		Plunging Anticline	Test well drilling.
Bell Springs	Frontier ? (Oil)				Mesa Verde	Mowry ?	Faulted Anticline	Test well plugged back to oil showing at 1,900 ft. Other wells drilling.
Eight Mile Lake	Frontier (Gas)	Frontier (Gas)	3,800 Ft.	Not Determined	Steele Shale	Wall Creeks	Broad Anticline	Two wells drilled to gas in Frontier—third well drilling—gas line to Parco.
Dad					Wasatch	?	Monocline	Oil found on west slope of monocline at shallow depth.
Rawlins					Steele		Broad Faulted Anticline	Test well drilling 3 miles west of Rawlins.
Red Dome					Chugwater	Embar	Dome Doubtful	Closure doubtful well drilling.
Sheep Mountain					Embar		Faulted Anticline Doubtful	Possible commercial production at shallow depth in Amsden or Madison.
Derby		Embar	1,000 Ft.	640 A.	Chugwater	Tensleep	Dome Favorable	Untested to Amsden and Madison.
Dallas		Embar	800 Ft.	800 A.	Chugwater	Tensleep	Dome Favorable	Untested to Amsden and Madison
Hudson		Embar	1,400 Ft.	800 A.	Chugwater	Tensleep	Faulted Anticline	Untested to Amsden and Madison.
Megown					Benton Shale	2nd Wall Creek	Faulted Dome	Well drilling.
Plunkett	Mowry Sand Lenses		500 Ft.	160 A.	Mowry	Morrison	Sharp Anticline	Small production taken from sands in Mowry shale—field abandoned.
Sage Creek		Embar	900 Ft.	Not Determined	Chugwater	Embar	Sharp Anticline Favorable	Tensleep, Amsden and Madison sands are untested—small production in Embar.
Winkleman	Dakota (Gas)	Lakota (Gas)	900 Ft.	Not Determined	Mowry	Sundance	Faulted Anticline	Oil showing in Lakota gas in Dakota—possible oil production in Dakota below gas cap.

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Pilot Butte		Shanon Sands and Shale	1,200 Ft.	Shallow Productive Area About 320 A.	Pierre Shale	Frontier ?	Dome	Favorable for deep test—land titles in litigation.
Sheldon	Frontier				Pierre Shale	3rd Wall Creek	Sharp Anticline	Two wells drilled, possibly off structure, failed to develop commercial production. Good showing gas and some oil in 2nd Wall Creek sand—3rd well drilling.
Black Mountain					Benton	Sundance ?	Faulted Anticline	Test well off structure area favorable for further investigation.
Maverick Springs		Embar	1,300 Ft.	800 A.	Chugwater	Tensleep	Dome	Large black oil production shut in —no pipe line.
Circle Ridge		Embar	290 Ft.	Not Determined	Embar	Tensleep	Dome	Shallow production in Embar.
Sand Draw		Wall Creeks (Gas)	2,550 Ft.	900	Steele Shale	Mowry	Sharp Anticline	North end untested—several lower sands untested due to heavy gas pressure—gas piped to Riverton and Lander.
Alkali Butte	Oil Showing in Morrison				Mowry	Sundance	Sharp Faulted Anticline	Unfavorable—test drilled found showing of oil and gas.
Conant Creek					Morrison		Open Faulted Anticline	Unfavorable.
Burley					Chugwater	Embar	Dome	Favorable for test to Tensleep, Amsden and Madison.
Logan Gulch					Niobrara		Plunging Anticline	Small structure tested to base of Niobrara.
Buck Springs					Fort Union	Pierre	Plunging Anticline	Favorable but deep.
Dutton Basin					Chugwater	Tensleep ?	Narrow Anticline	Shallow drilling on limb of anticline—recent test by Texas abandoned.
Rattlesnake					Chugwater		Faulted Terrace Doubtful	Some drilling done on east monoclinic limb to Dakota which shows saturation at exposure—results discouraging.
Muskrat	Shannon (Gas)				Pierre	Shannon	Broad Anticline	Test well drilling.
Riverton					Fort Union	Lance	Plunging Anticline	Test well drilling.
Tough Creek					Fort Union	Cloverly	Monoclinic Limb Sealed by Tertiary	Oil showings in Mowry. Test well drilling. Doubtful.
Bridger Creek					Lance ?	Lance ?	Tertiary Anticlinal Deposition	Test well drilling.
Schoening					Fort Union		Sharp Anticline Doubtful	Test well drilling.
Depass	Embar				Chugwater	Embar	Dome	Test well drilling showing of oil in Embar.
Mid-Northern					Fort Union		Broad Anticline	Test well standing results unfavorable.
Rex Lake		Dakota and Lakota	3,800 Ft. and 3,850 Ft.	Not Determined	Steele Shale	Lakota	Small Sharp Anticline	Production about 400 bbl. per well —three wells drilling.

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
James Lake					Steele Shale	Dakota	Narrow Anticline	Showing of oil in sand possibly Frontier. Not favorable.
Two Rivers					Steele Shale	Dakota	Small Anticline	Tested to and through Dakota—water in all sands.
Quealy					Steele Shale	Dakota	Narrow Anticline	Water in all sands—show of oil in Mowry shale.
Cooper Cove	Gas in Shannon Oil Showing in Frontier			1,100 A.	Steele Shale	Frontier	Faulted Anticline	Tested to top of Mowry—favorable for Dakota or Lakota test.
Rock River	First Muddy 2,550 Ft. Second Muddy 2,650 Ft.	Dakota	2,750 Ft.		Steele Shale	Morrison	Narrow Anticline	Light oil production about 3,500 bbls. per day from about 52 wells—productive area determined.
Dutton Creek					Steele Shale ?		Small Narrow Anticline	To be drilled—structure covered with terrace gravel.
McGill					Chugwater	Embar	Narrow Anticline	One well drilled to Forelle or Embar sand was dry—deeper sands untested.
Gillespie					Embar	Amsden	Open Plunging Anticline	Tested for black oil and found barren.
Foote Creek					Morrison	Morrison	Small Narrow Anticline	Tested to red beds and found barren.
Medicine Bow		Frontier	4,000 Ft.	Not Determined	Mesaverde	Frontier	Narrow Anticline	Test to Frontier found fair production in Frontier—deeper test in progress.
Como Ridge					Chugwater	Tensleep	Broad Plunging Anticline	Tested—artesian water in Tensleep.
Allen Lake	Muddy (Gas)				Niobrara	Muddy	Narrow Anticline	Gas in two wells from Muddy about 15,000,000 cu. ft. capacity—well drilling.
Big Hollow	Harris				Niobrara	Chugwater	Domes on Anticline	Small production in Harris sand at 900 ft.
Mandell					Steele Shale	Muddy	Small Dome	Tested to Muddy—no production.
Lake Hattie					Steele Shale	Dakota	Terraced Anticline	Showing of oil in Muddy and Dakota.
Centennial					Steele Shale	Dakota	Faulted Anticline	Well drilled to Dakota at 3,000 ft.—found water.
Sodergreen					Steele Shale	Dakota	Small Narrow Anticline	Found water bearing and abandoned.
Flattop					Amsden		Dome	Amsden sand exposed—possibilities for oil not favorable.
Oil Springs					Frontier	Muddy	Narrow Faulted Anticline	Gas in Mowry sand lens—water in Muddy—test possibly off structure.
Freezeout Hills					Tensleep		Narrow Dome	Possibilities doubtful and unfavorable due to deep erosion.
Troublesome					Chugwater		Open Plunging Anticline	Not favorable.

WYOMING OIL STRUCTURES—In the Following Order: Southwestern, Rawlins-Lost Soldier, Lander District, Laramie-Medicine Bow (Continued)

Field	Minor Producing Sands	Major Producing Sands		Approximate Producing Area	Surface Formation	Deepest Sand Tested	Structural Conditions	REMARKS
		Name	Approximate Depth					
Shirley					Niobrara	Lakota	Open Plunging Anticline	Test through Frontier to Lakota—found all sands dry or water bearing.
Simpson Ridge		Shannon (Oil)			Mesaverde		Narrow Anticline	Test well drilling at over 6,000 feet.
Elk Mountain					Pierre Shale	Dakota	Sharp Dome	Tested through Dakota.
Bothwell					Benton Shale	Dakota	Narrow Anticline	Test found water in Dakota.
Walcott					Mesaverde		Overthrust	Very deep—unfavorable—untested.
St. Marys					Mesaverde		Thrust Fault.	Unfavorable—untested.
Cedar Ridge					Mesaverde		Anticline	Favorable but deep—untested.
Miller Hill								

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Southeastern Wyoming in alpha-

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CORRELATION TABLE SHOWING THE GEOLOGICAL FORMATIONS IN THE OIL PRODUCING AREAS OF WYOMING

SYSTEM OR SERIES	GROUP	FORMATIONS									
		Southwestern Wyoming	Wind River Basin	Big Horn Basin	Shoshone River Basin	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		Ogallalla Arikaree Brule Clay Chadron
		Knight Fowkes Almy				Wind River					
		Evanston		Fort Union	Fort Union	Fort Union	Fort Union		Fort Union	Fort Union	
Tertiary or Cretaceous		Laramie		Ilo (Lance)	Ilo (Lance)	Lance	Laramie		Lance	Lance	
Cretaceous	Montana	Adaville	Mesaverde	Meeteetse	Meeteetse	Lewis	Lewis	Lewis	Fox Hills	Fox Hills	Fox Hills
				Mesaverde (Eagle sand)	Gebo (Eagle)	Mesaverde (Teapot sand) (Parkman sand)	Mesaverde	Mesaverde			
		Hilliard (Blair) (Baxter shale)	Mancos	Pierre Basin (Niobrara)	Cody	Steele (Shannon sand)	Pierre	Steele	Pierre	Pierre	Pierre
						Niobrara	Niobrara	Niobrara	Niobrara	Niobrara	Niobrara
	Colorado					Carlile	Frontier (Wall Creek sands)	Benton (Frontier sands) (Mowry shale) (Muddy sand)	Carlile	Carlile	Benton (Mowry shale)
		Frontier		Frontier (Torchlight-Peay sands)	Frontier (sands)	Frontier (Wall Creek sands)			Greenhorn	Greenhorn	
		Aspen		Mowry (Kimball sand) (Octh Louie sand)	Mowry	Mowry	Mowry (Shale & sand)		Granerous (Mowry shale) (Newcastle sand)	Granerous (Mowry shale) (Newcastle sand)	
				Thermopolis (sand)	Thermopolis (sand)	Thermopolis (sand)	(Muddy sand)				
	Lower Cretaceous	Bear River	Dakota (sand) (Shale and sand)	Cloverly (Greybull sands)	Cloverly (Greybull sands)	Dakota (sands)	Dakota (sands)	Cloverly (sands)	Dakota Fuson Lakota	Dakota Fuson Lakota	Cloverly
	Cretaceous ? Jurassic ?	Beckwith	Morrison	Morrison (sand)	Morrison (Byron sand)	Morrison	Morrison	Morrison	Morrison	Morrison	Morrison
Jurassic		Twin Creek Nugget	Sundance	Sundance	Sundance	Sundance	Sundance	Missing	Sundance	Sundance	Sundance
Triassic		Ankareh Thaynes Woodside	Chugwater	Chugwater	Chugwater	Chugwater	Chugwater	Chugwater	Spearfish	Spearfish	Chugwater
Permian (Carboniferous)		Park City	Embar (sand)	Embar (sand)	Embar	Embar (sand)	Casper		Minnekahta Opeche	Minnekahta Opeche	
Pennsylvanian (Carboniferous)		Weber		Tensleep Amsden		Tensleep Amsden		Forelle Satanka Casper	Hartville	Minnelusa	Casper
Mississippian (Carboniferous)				Madison		Madison			Guernsey	Pahasapa	