

Eleventh Biennial Report
of the
State Geologist

For the Period
October 1, 1920
to and including
September 30, 1922



G. B. MORGAN
State Geologist



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G. B. MORGAN
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To His Excellency,
Robert D. Carey,
Governor of Wyoming.

Dear Sir: Pursuant to the requirements of Section 302,
Wyoming Compiled Statutes, 1920, I beg to submit here-
with the biennial report of the State Geologist for the
period ending September 30, 1922.

Very respectfully submitted,

G. B. MORGAN,

State Geologist.

Cheyenne, Wyoming,
October 31, 1922.

BIENNIAL REPORT

October 1, 1920, to and Including September 30, 1922

ACTIVITIES AND EXPENDITURES OF THE STATE GEOLOGIST'S OFFICE

Since the enactment of the law regulating drilling and operation of oil and gas wells and repealing Chapter 224 of Compiled Statutes of 1920, this going into effect April 1, 1921, the State Geologist's Office contains a separately functioning department, designated roughly as the "Inspection of Oil and Gas Wells" department. The work in this department is done under separate appropriations for salary and contingent expenses.

The personnel of the office comprises the State Geologist, two Oil and Gas Well Inspectors, and one Clerk, who does the clerical and stenographic work for the entire force.

General Administration

The regular work of the State Geologist is being carried out as in the past and the general administration relating to this department embraces the following functions:

- A. General publicity work, which consists of collecting and distributing information on oil and gas fields and other mineral deposits in the State; the publication of geological bulletins and maps; and advertising the mineral wealth of the State to the people at large.
- B. Examinations and reports on lands (mineral and oil) for the State Land Board.
- C. Inspection of metalliferous mines.

Under Function A, certain well defined phases of routine work have devolved upon the office by the varied demands of the public.

The correspondence deals not only with the people of Wyoming and the various states, but with those of foreign countries as well. It includes inquiries in regard to applications for positions, especially technical; interpretations of the mining laws—both Federal and State; the status of oil companies and their holdings; physical geography and geology of Wyoming; general reports on drilling operations, including statistics; processes of mining and milling, diamond core drilling, flotation methods, etc.; underground water resources; character of specified tracts of land; and the examination of rocks for mineral and fossil classification. If the demands for any particular line of information are heavy, data are collected, as funds permit, and incorporated into publications and disseminated in that way; but in the majority of cases each letter is given individual attention.

Equally important is the attention that must be given to callers at the office who wish either to consult the library or to obtain from the State Geologist information that has been collected by personal observation. Because of many field trips during the season the State Geologist becomes familiar with all parts of the State, not only along lines of economic geology, but on those of development both active and prospective.

For the publicity work proper, detailed investigations and in some instances surveys are made and the data published in the form of reports, which are distributed free of charge. In some cases the newspapers are used as a medium of distribution. The mailing list includes all State colleges and universities, miscellaneous school libraries, miscellaneous libraries, Wyoming county libraries, Wyoming newspapers and technical magazines throughout the country, state geological surveys and geological surveys of foreign countries, besides a general mailing list including individuals and corporations.

The following are the publications issued from October 1, 1920, to and including September 30, 1922:

Map of "Oil Fields North of Rawlins" (to accompany Press Bulletin No. 2), November 1, 1920.

Map of Rock Creek Oil Field (to accompany Press Bulletin No. 7), November 1, 1920.

Press Bulletin No. 10, Mineral Resources of Wyoming, October 1, 1920.

Map, State Geologic, Third Edition, April 1, 1921.

Bulletin No. 18, Mining Laws—State and Federal. June 1, 1921.

Press Bulletin No. 11, Fossil Oil Field, August 16, 1921.

Press Bulletin No. 12, Review of Conditions in Laramie Basin. May 5, 1922.

Press Bulletin No. 13, Lost Soldier-Ferris-Mahoney District. July 19, 1922.

The work under Function B, which embraces examinations and reports on State lands for the guidance of the State Land Board, constitutes a very large part of the State Geologist's duties. This work is constantly increasing as State lands are being developed for oil and other minerals and will continue to increase to such an extent that in a very short time it will probably be necessary to employ an assistant unless some other means are devised for handling this problem, as for instance, the incorporation of a mineral survey of State lands as suggested in another part of this report.

In addition to making examinations and advisory reports for the use of the State Land Board, the State Geologist is frequently consulted on matters pertaining to oil, gas and other mineral developments on State lands, both in and out of Board meetings. The office has supervision of all oil and gas operations on State lands and also certain authority over other operations, including coal and metal mining. The oil and gas supervision is extended to the Oil and Gas Inspectors where the cases involve more intricate

technical problems, such as water shut-offs, mudding and cementing, and the processes for increasing production. However, the State Geologist has in the past exercised personal supervision in many of these cases and will continue to do so when the occasion requires. The following is a summary of the activities for the biennium under Function B of the general administration:

By G. B. MORGAN

Work	Section	Field	Date	Character
Report	21-33-76	Big Muddy	Nov. 1, 1920	oil and gas (abandonment)
Examination and report	36-36-65	Lance Creek	Nov. 1, 1920	oil and gas (gen'l conditions)
Report	9-33-76	Big Muddy	Jan. 14, 1921	oil and gas (abandonment)
Report	36-20-78	Rock Creek	Jan. 15, 1921	oil and gas (abandonment)
Report	16-57-97	Frannie	Feb. 4, 1921	oil and gas (abandonment)
Report	16-33-76	Big Muddy	Feb. 4, 1921	oil and gas (production)
Examination and report	34-20-78	Rock Creek	March 2, 1921	pipe line arrangement
Report	36-35-84	Pine Mountain	March 31, 1921	oil and gas (abandonment)
Report	21-33-76	Big Muddy	April 1, 1921	oil and gas (abandonment)
Report	16-46-63	Osage	May 18, 1921	oil and gas (gen'l conditions)
Report	36-43-100	Buffalo Basin	May 19, 1921	gas (gen'l conditions)
Examination and report	16-33-73	Inez	May 23, 1921	coal (geology and product'n)
Examination and report	4-17-70		May 20, 1921	limestone (geology and production)
Examination and report	5-29-98)		June 11, 1921	mineral character
Examination and report	16-32-79		June 14, 1921	asbestos (geological)
Report	8-33-76)			
	9-33-76)	Big Muddy	July 29, 1921	oil and gas (curtailing production)
	10-33-76)			
Examination and report	36-23-116	Frontier	July 29, 1921	coal (geological)
Report	36-43-94	Warm Springs	Sept. 8, 1921	oil and gas (gen'l conditions)
Examination and report	16-57-98	Polecat	Sept. 22, 1921	gas (operations)
Report	36-22-86	Platte River	Nov. 1, 1921	oil and gas (abandonment)
Examination and report	36-34-77	Big Muddy	Dec. 5, 1921	coal (geological)
Report	36-26-88	Mahoney	Dec. 7, 1921	oil and gas (production and offsets)
Report	34-20-78	Rock Creek	Jan. 20, 1922	oil and gas (gen'l conditions)
Report	26-20-78	Rock Creek	Feb. 14, 1922	gas (valuation)
Report	36-43-94	Warm Springs	Feb. 28, 1922	oil and gas (gen'l conditions)
Report	36-36-65	Lance Creek	March 28, 1922	oil and gas (abandonment)
Examination and report	36-36-86	Powder River	March 28, 1922	character of land (geology)
Report	4-33-76	Big Muddy	April 10, 1922	oil and gas (abandonment)
Report	15-33-76	Big Muddy	June 1, 1922	oil and gas (drilling and production)
Report	10-33-76	Big Muddy	June 2, 1922	oil and gas (abandonment)

Report	4-33-76	Big Muddy	June 2, 1922	oil and gas (abandonment)
Examination and report	26-20-78)			
	34-20-78)	Rock Creek	June 5, 1922	gas (production)
	14-19-78)			
Report	16-45-62	Newcastle	June 17, 1922	oil and gas (abandonment)
Examination and report	36-36-65)			
	35-36-65)	Lance Creek	June 23, 1922	oil and gas (production)
Examination and report	36-14-119	Evanston	July 24, 1922	coal (geological)
Report	36-40-79	Salt Creek	July 28, 1922	oil (abandonment)
Examination and report	18-43-93	Red Springs	Aug. 25, 1922	oil and gas (geological)
Examination and report	36-53-100	Elk Basin	Aug. 25, 1922	oil and gas (gen'l conditions)
Report	36-35-84	Pine Mountain	Aug. 28, 1922	oil and gas (gen'l conditions)
Examination and report	36-43-94	Warm Springs	Aug. 28, 1922	oil and gas (gen'l conditions) and drilling
Report	15-33-76	Big Muddy	Aug. 29, 1922	oil and gas (drilling and production)
Examination and report	36-16-73		Sept. 28, 1922	limestone
Examination and report	16-32-78		Sept. 28, 1922	minerals
Examination and report	36-33-68	Lost Springs	Oct. 1922	coal

Miscellaneous Reports

Examination and report to Governor	Byron gas field and carbon black	Jan. 28, 1921
Report to Governor	Lance Creek gas situation	Jan. 23, 1922
Report to Public Service Commission	Gas reserves, Sec. 36-26-88, Mahoney dome	Feb. 28, 1922
Report	Salt Creek deduction for pipe line losses	Apr. 11, 1922
Examination for Public Service Commission	Poison Spider field—gas	Sept. 15, 1922

The duties under Function C have not been heavy of late years because there are very few metal mines operating in the State. Several examinations were made, in 1921 and 1922, in the Centennial and Atlantic City districts. A revival of interest in mining is becoming noticeable, however, and it is predicted that the next two years will show a marked improvement and that a number of real copper, gold and silver mines will be opened up.

Expenditures of State Geologist (General Administration)

The last Legislature appropriated \$8,500.00 as a contingent fund for the operation of this office, which was available April 1, 1921. Departmental expenses, including traveling expenses, office expenses, motor expenses, clerical hire, general office and field equipment outlays, amount

to \$6,270.47 from April 1, 1921, to and including September 30, 1922, leaving a balance on hand at that time of \$2,229.53. See Budget for detailed expenditures.

Inspection of Oil and Gas Wells

The last Legislature saw fit to enlarge the scope and increase the duties of this office by giving it supervision over the drilling and operation of oil and gas wells on State and patented lands. (See Session Laws of Wyoming, 1921, Chapter 157.) The State Geologist is empowered to prescribe and enforce rules and regulations governing the drilling and abandonment of oil and gas wells and the waste of oil and gas therefrom, which rules and regulations shall be the same as those adopted by the United States Bureau of Mines governing methods of operations upon lands embraced in Federal leases. The State Geologist has authority to employ two inspectors to carry out the provisions of of the act.

The activities of this sub-department began April 1, 1921. Two inspectors were appointed during this month, namely, Mr. C. G. Staley of Lander, Wyoming, and Mr. O. W. White of Casper, Wyoming. Mr. Staley was given the territory in the south half of the State and the district around Lander. Mr. White was given the territory in the north half of the State, including the Casper, Lance Creek, Osage and Big Horn districts.

The work of these inspectors was carried on in an intelligent and efficient manner and many tangible results have been obtained through their assistance and supervision in repairing oil and gas wells and in cases of abandonment and especially in cases where gas was being wasted and water was penetrating the oil and gas sands. Of particular benefit to the State were the investigations of the inspectors on State lands, notably in Salt Creek, Lance Creek, Osage, Grass Creek, Little Buffalo Basin, Warm Springs, Sand Draw, Alkali Butte, Mahoney, Ferris, Rock Creek and Baxter Basin fields. It is believed that oil production from State lands has been increased and the oil and

gas reserves in State lands have been safeguarded by this supervision and by the suggestions and recommendations that have been made by the inspectors, which recommendations were carried out by the oil operators either voluntarily or because of the insistence of the State Land Board and this office.

Owing to the diminution of the contingent funds for this work, the services of one inspector were discontinued in October, 1922. It is to be hoped that the next Legislature will appropriate sufficient funds for carrying out the provisions of the act throughout the entire biennium.

The activities of the inspectors are briefly set out in the following capitulation:

By O. W. WHITE					
Land	Section	Field	Date	Character	
State	16-46-63	Osage	May 16, 1921	general report	
patented	45-96	Ilo	May 16, 1921	general conditions	
patented	6-49-66	Upton	May 16, 1921	repair	
State	36-46-64	Osage	May 17, 1921	abandonment	
State	36-43-94	Warm Springs	June 10, 1921	general conditions	
patented	12-44-98	Hamilton	June 10, 1921	abandonment	
patented	22-47-65	Thornton	July 16, 1921	abandonment	
patented	31-48-90	Hidden Dome	July 19, 1921	shutting in gas	
patented	12-45-97	Golden Eagle	July 19, 1921	general conditions	
patented	6-42-61	Dewey	Sept. 20, 1921	operations and abandonment	
patented	4-35-65	Lance Creek	July 19, 1921	gas situation	
State	36-46-64	Osage	July 19, 1921	general conditions	
State	36-36-65	Lance Creek	Sept. 7, 1921	abandonment	
State	8-33-76				
State	9-33-76	Big Muddy	July 27, 1921	curtailing production	
State	10-33-76				
State	36-43-94	Warm Springs	Aug. 5, 1921	general conditions	
State	36-43-94	Warm Springs	Sept. 7, 1921	general conditions	
State	36-40-79	Salt Creek	Sept. 7, 1921	surface rights	
State	36-35-84	Pine Mountain	Nov. 8, 1921	general conditions	
patented	33-56-97	Byron	Dec. 1, 1921	abandonment	
State	36-40-79	Salt Creek	Jan. 5, 1922	general report	
State	36-40-79	Salt Creek	Jan. 21, 1922	supplemental to report	January 5,
State	36-43-94	Warm Springs	Jan. 27, 1922	price of oil	
State	36-35-84	Pine mountain	Feb. 14, 1922	general conditions	
State	4-33-76	Big Muddy	March 7, 1922	production and abandonment	
State	36-48-100	Buffalo Basin	May 16, 1922	production	
State		Big Muddy	May 16, 1922	gas	
patented	19-58-09	Elk Basin	May 29, 1922	repair	
patented	10-55-97	Byron	May 29, 1922	abandonment	
patented	24-58-100	Elk Basin	May 29, 1922	operations	
patented	17-52-93	Greybull	May 29, 1922	abandonment	
State	36-40-79	Salt Creek	May 29, 1922	repair	
State	36-35-84	Pine Mountain	May 29, 1922	general conditions	
State		Big Muddy	May 31, 1922	general conditions	
State		Little Buffalo Basin			
State	36-46-64	Osage	May 29, 1922	general conditions	
State	36-34-79	Casper	May 29, 1922	abandonment of lease	
State	4-33-76	Big Muddy	May 29, 1922	general conditions	
State	10-33-76	Big Muddy	May 29, 1922	abandonment	
patented	11-26-67	Guernsey	July 18, 1922	abandonment	
State	36-35-84	Pine Mountain	July 27, 1922	operations	
State	36-40-79	Salt Creek	July 27, 1922	general conditions	
State		Elk Basin	July 27, 1922	repair	
State			July 27, 1922	leakage in wells	

State	16-46-63	Osage	July 27, 1922	abandonment
State	4-33-76	Big Muddy	Sept. 5, 1922	abandonment
State	36-35-84	Pine Mountain	Aug. 14, 1922	general conditions
State	36-35-84	Pine Mountain	Aug. 19, 1922	general conditions

By C. G. STALEY

Land	Section	Field	Date	Character
State	36-36-94	Shoshoni	April, 1921	mudding off water
patented	1-33-95	Alkali Butte	May, 1921	abandonment
patented	1 N.-1 W.	Sage Creek	May, 1921	general conditions
patented	3 N.-1 W.	Pilot Butte	May, 1921	abandonment
State	16-32-79	Casper Mountain	June 1921	geological
State	19-78)	Rock Creek	June, 1921	general conditions
Patented	26-90	Little Lost Soldier	June, 1921	general conditions
State	16-27-95	Buffalo Basin	June, 1921	water conditions
State	36-23-116	Kemmerer	July, 1921	geological
State	36-21-117	Fossil	July, 1921	general report
State	28-114	Big Piney	July, 1921	examination of water conditions
State	16-57-98	Polecat	Aug., 1921	general conditions
patented	12-45-96	Golden Eagle	Aug., 1921	general conditions
patented	13-32-99	Dallas	Aug., 1921	mudding off water
State	16-20-77	Rock Creek	Sept., 1921	abandonment
State	36-26-87	Ferris	Sept., 1921	general conditions
State	35-98	Pine Mountain	Oct., 1921	re-survey of line between Sections 35 and 36.
State	36-22-86	Ft. Steele	Nov., 1921	abandonment
State		Rock Creek	Nov., 1921	general conditions and remaining supply of oil
State	36-26-88	Mahoney	Nov., 1921	offset to Ohio Oil Co. on 31-26-85
State		Ferris-Mahoney-		
		Lost Soldier	Dec., 1921	general conditions
State		Rock Creek	Dec., 1921	general conditions
patented	1-33-95	Alkali Butte	Jan., 1922	Abandonment and plugging of well
State	36-20-78	Rock Creek	Jan., 1922	amount of gas taken from State and University land
State	16-31-98	Derby	March, 1922	shutting off water and new drilling
State	36-35-92	Horseshoe	March, 1922	general conditions
State		Rock Creek	April, 1922	general conditions
State	36-17-104)	Baxter Basin	April, 1922	general conditions
State & patented	16-16-104)	Mahoney, Ferris, Buffalo Basin, Derby, Dallas	April, 1922	water conditions
patented	26-90	Little Lost Soldier	May, 1922	determination of percentage of water
patented	35-34-95	Alkali Butte	May, 1922	abandonment
State	16-46-63	Osage	June, 1922	abandonment
patented	54-77	Arvada	June, 1922	samples of gas
patented	17-48-62	Billie Creek	June, 1922	general conditions
State & patented	36-65	Lance Creek	June, 1922	general conditions
State	16-40-79	Salt Creek	June, 1922	general conditions
patented	32-95	Big Sand Draw	June, 1922	general conditions
State	16-16-104	Baxter Basin	July, 1922	gas
State	36-14-119	Evanston	July, 1922	geological
State		Star Valley	July, 1922	geological
		Ferris, Mahoney)		
		Lost Soldier)	Aug., 1922	general conditions
		Buffalo Basin)		
State	16-27-95	Buffalo Basin	Aug., 1922	mudding off water
State	16-16-104	Baxter Basin	Sept., 1922	gas well
		Dry Piney	Sept., 1922	general conditions
State	16-32-79	Casper Mountain	Sept., 1922	geological and general conditions
State & patented		Pine Mountain)		
		Poison Spider)	Sept., 1922	gas reserves
		S. Casper Creek)		

In addition to the work done by the inspectors, many cases in this department were handled from the office by

correspondence. This is more or less routine work and its scope is indicated in the following table:

Field	Abandonment	Repairs	Drilling
	(Number of Cases)		
Beaver Valley	1		
Bessemer Bend	1		
Big Hollow		1	
Big Muddy	19	24	3
Billie Creek			1
Byron	3		
Elk Basin	1	5	2
Ferris	1		1
Ft. Steele	1		
Grass Creek	1	33	
Greybull	3	4	3
Harney Creek	1		
Lance Creek	6		4
Medicine Bow			1
Millbrook	1		
Osage	2	4	7
Quealy	1		
Rock Creek	4	1	
Rock Springs			1
Salt Creek	1	26	1
Saratoga		1	
Skull Creek			1
Upton	5		
Warm Springs		3	
Total	52	102	25

Expenditures of Oil and Gas Well Inspection Department

With the creation of the Oil and Gas Well Inspection Department, the last Legislature appropriated \$8,000.00 to carry on the operations of the department for the biennium April 1, 1921, to and including March 31, 1923. Expenses incurred during the period April 1, 1921, to and including September 30, 1922, including traveling expenses, motor expenses, clerical hire and printing, amounted to \$6,671.44, leaving a balance on hand at that time of \$1,328.56. See Budget for detailed statement of expenditures.

MINERAL INDUSTRIES OF WYOMING

The Office of State Geologist naturally comes into close contact with the mineral industries of the State, those industries which are producing raw materials and preparing them for the market. The principal minerals mined in this State are coal, oil, gas, and iron. There are a number of other minerals which are produced to a lesser extent, including limestone, gypsum, building stone, uranium, soda, clay and in past years copper, gold and silver. The following tables show the production of coal, gas, oil and miscellaneous minerals by counties for the years 1920 and 1921. These figures are obtained from the tax returns and therefore their valuations are rather low. Below these tables will be found the estimates made by the U. S. Geological Survey on the production of coal, natural gas, oil or petroleum, and natural-gas gasoline for the same period.

Mineral Products for 1920

Coal		
County	Tons	Valuation
Big Horn	1,823.00	\$ 4,101.75
Carbon	724,390.40	2,167,300.95
Converse	5,182.00	13,491.50
Crook	355.00	710.00
Fremont	292,167.25	802,623.94
Hot Springs	592,450.30	1,777,350.90
Johnson	15,420.00	34,695.00
Lincoln	1,473,506.50	4,296,802.51
Natrona	2,091.00	4,704.75
Park	5,142.00	11,355.75
Sheridan	1,931,077.10	5,305,058.53
Sweetwater	4,330,536.31	12,968,382.90
Uinta	47,798.00	143,261.25
Weston	244,358.65	671,986.29
Total	9,666,297.51	\$28,201,825.65

Gas		
County	Cu. Ft.	Valuation
Big Horn	2,631,830,236	\$129,260.04
Carbon		32,320.00
Fremont		2,078.00
Hot Springs	213,319,000	12,799.14
Natrona	2,062,356,867	123,741.41
Niobrara		264.50
Park	159,421,000	10,532.25
Washakie	662,831,209	39,769.67
Uinta	205,000	123.00
Total	5,729,758,312 cu.ft.	\$350,888.00

Oil		
County	Bbls.	Valuation
Big Horn	76,095.36	\$ 178,824.10
Carbon	1,444,032.58	3,032,408.42
Converse	2,067,512.09	4,007,599.52
Crook	149.38	365.98
Fremont	166,239.6	233,873.46
Hot Springs	1,353,602.64	3,074,260.97
Natrona	9,731,878.7	19,304,391.02
Niobrara	441,243.83	1,014,860.81
Park	804,227.21	1,891,108.94
Sweetwater	206,902.36	434,494.96
Uinta	1,880.00	3,948.00
Weston	21,290.32	52,161.29
Total	16,315,054.07	\$33,228,357.47

Miscellaneous Minerals			
County	Material	Tons	Valuation
Albany	gypsum	19,689	\$ 56,113.65
Big Horn	limestone (sugar beet use)		85,870.45
Carbon	building stone		300.00
Laramie	limestone (sugar beet use)		43,688.39
Niobrara	uranium ore		2,269.20
Natrona	soda		2,763.00
Platte	iron ore	455,280.70	1,138,201.75
	limestone (sugar beet use)		59,531.33
Total			\$1,388,737.77

Mineral Products for 1921

Coal		
County	Tons	Valuation
Big Horn	179,110.50	\$ 536,521.12
Carbon	563,562.00	1,543,293.85
Converse	2,303.00	5,181.95
Crook	366.00	732.00
Fremont	243,056.62	666,028.46
Hot Springs	273,093.70	819,281.10
Johnson	9,665.80	21,748.05
Lincoln	1,304,453.85	3,830,904.50
Park	3,293.34	7,282.02
Sheridan	936,840.05	2,568,437.16
Sweetwater	3,406,324.99	10,136,189.52
Uinta	38,129.10	104,782.28
Weston	121,655.10	334,551.53
Total	7,081,854.05 tons	\$20,474,933.34

Gas		
County	Cu. Ft.	Valuation
Big Horn	1,036,502.527	\$ 62,635.15
Carbon	1,466,300.000	43,990.15
Fremont	39,700.000	1,190.00
Hot Springs	298,404.457	13,284.27
Natrona	7,800,993.700	330,848.12
Park	217,794.000	130,067.62
Washakie	1,842,953.657	110,577.22
Weston	33,657.500	1,009.72
Total	12,736,305,841 cu.ft.	\$576,602.25

Oil		
County	Bbls.	Valuation
Big Horn	79,896.26	\$ 127,834.02
Carbon	1,720,638.46	2,160,323.24
Converse	1,805,004.79	2,147,955.70
Fremont	164,740.95	123,188.60
Hot Springs	1,169,881.02	1,786,023.14
Natrona	10,389,296.56	12,296,376.51
Niobrara	405,125.82	608,621.64
Park	730,284.83	1,168,455.72
Sweetwater	380,811.16	300,840.82
Uinta	2,551.00	3,188.75
Weston	83,140.06	122,175.90
Total	16,931,370.91 bbls.	\$20,845,584.04

Miscellaneous Minerals			
County	Material	Tons	Valuation
Albany	gypsum		\$ 3,644.87
Big Horn	clay products	5,000	10,000.00
	limestone (sugar beet use)		3,960.81
Carbon	building stone		65.00
	clay (bentonite)		324.50
Laramie	limestone (sugar beet use)		38,963.44
Natrona	soda		2,543.00
Platte	iron ore		657,162.50
	limestone (sugar beet use)		57,182.36
Total			\$773,846.48

Recapitulation for 1920

Mineral	Valuation
Coal	\$28,201,825.65
Gas	350,888.00
Oil	33,228,357.47
Miscellaneous minerals	1,388,737.77
Total	\$63,169,808.89

Recapitulation for 1921

Mineral	Valuation
Coal	\$20,474,933.34
Gas	576,602.25
Oil	20,845,584.04
Miscellaneous minerals	773,846.48
Total	\$42,670,966.11

Returns on Production of Coal, Oil and Gas
Made by the United States Geological Survey

Year	Coal Tons	Valuation
1920	9,630,271	\$28,741,000.00
1921	7,200,666	23,358,500.00
1922 (Jan.-June, inc.)	2,563,000	

Year	Oil Bbls.
1920	17,071,000
1921	19,221,800
1922 (Jan.-June, inc.)	11,463,600

Year	Produced gal.	Price per gal.	Valuation	Gas consumed
1920	8,711,037	20 cents	\$1,735,828.00	4,809,277,000
1921	14,557,600	11 cents	1,599,600.00	4,559,600,000

Year	Produced cu. ft.	Consumed cu. ft.	Price per M	Valuation
1920	12,956,000,000	10,312,000,000	\$0.078	\$805,000.00
1921	no returns			

It will be noted that the returns made by the United States Geological Survey are somewhat higher than those made to the State Board of Equalization. For instance, in 1920 the valuation by counties shows a production of about 5.7 billion cubic feet of gas, valued at \$350,888.00, while the United States Geological Survey reports practically 13 billion cubic feet, valued at \$805,000.00. The coal returns appear to be about the same for both years, but in the oil returns the Survey reports are considerably larger.

Considering, therefore, that the mineral production of the State is somewhat inadequately represented by the tax returns and adding in the production of natural gasoline, which is not considered in the above tabulations, we have in round numbers a total valuation of about 70 million dollars for 1920 and about 50 million dollars for 1921, which sums represent the value of the raw mineral products only. The very decided difference between the total valuations for 1920 and 1921 is mostly due to the decrease in the price of oil in 1921 and to the decrease in the amount of coal mined in 1921, as compared to the previous year. It is believed that the returns for 1922 will approximate those for 1921.

It is rather difficult at this time to estimate the probable mineral production for 1922, owing to the fact that conditions in the coal and oil and gas industries have changed so abruptly. From April 1st until about the middle of August the coal mines of the State were about 95 per cent idle and practically no coal was produced other than that mined in the small wagon mines, which was a very inconsiderable amount. Since the settlement of the strike all of the mines have been working at full capacity and apparently turning out more coal than under normal conditions. It is probable, therefore, that the coal production this year will be almost equal to last year's production, notwithstanding the long period of inactivity.

Oil production in the State is constantly increasing, notwithstanding the low price of crude and the flooded market in the Rocky Mountain region. Scarcely a field in the State is producing up to its normal capacity and Salt Creek has been cut down to 30 per cent by pro-rating production from the different leases. New wells are being constantly brought in, however, and new pipe lines are being built to take care of the added production so that the end of the year will probably see a much larger production of crude oil than during the previous year.

There will be a large increase in the production and consumption of natural gas for 1922. The pipe lines from the

Mahoney and Wertz domes to Casper and from the Mahoney dome to Rawlins, both laid this year, will increase the production of gas very materially. A pipe line from the Elk Basin field to Billings, Montana, installed last year, opens up a new market for Wyoming gas. We can also look forward to a very marked increase in the production of natural gasoline for 1922. Wherever justified, compression and absorption plants are being installed either in the fields or at the places of delivery of the gas. In addition to the natural gasoline thus recovered, a great amount of drip gasoline or condensate is now being recovered from the pipe lines, especially in the fields. One well in the Wertz dome produces about 4,000 gallons of drip gasoline per day and quite a large plant with tankage has been constructed to take care of this condensate.

The estimate for the miscellaneous minerals for 1922 is an average of the figures for 1920 and 1921.

The following table sets out the estimates in detail:

Coal-----	6,500,000 tons	\$17,875,000.00
Gas-----	20,000,000,000 cu. ft.	1,000,000.00
Oil-----	24,000,000 bbls.	21,600,000.00
Natural gasoline-	20,000,000 gallons	2,200,000.00
Miscellaneous minerals		1,081,000.00
		<hr/>
Total		\$43,756,000.00

Comparisons

Few people realize the relative importance of the mineral industries in Wyoming as compared to the other industries, for instance, the live stock business. It has been generally assumed that the live stock interests in Wyoming are predominate and pay the most taxes. This is by no means true and a comparison of the tax returns on the live stock of the State with the tables above given shows that the mineral industries not only pay more taxes, but that they are more important to the welfare and prosperity of the people of this State. For 1920 the live stock valuation, including cattle, sheep, horses, swine, mules and goats, was

\$49,426,149.00. The minerals produced during that year were valued at \$63,169,808.00, 30 per cent higher than the live stock valuation in the State. For 1921 the live stock valuation was \$33,231,483.00 as compared to \$42,670,966.00 for mineral production, which is likewise 30 per cent greater.

In considering these comparative figures, it must also be remembered that the valuation on live stock is not valuation on the live stock produced for the market, but a valuation on the entire live stock holdings in the State; whereas the valuation on the mineral products is not a valuation on the mineral holdings, but only on such minerals as have been mined and marketed.

In addition to the money paid for the raw mineral products of the State, it is well to consider the comparatively large number of men working in the oil fields, in the coal, iron, and other mines, and in the refineries, and also the men engaged in transporting these mineral products and the materials and equipment used in the industry. Millions of dollars in wages are paid to these men yearly.

There are four large refineries and a number of small ones in the State, having a total capacity of about 85,000 barrels of crude oil per day. By the process of refining, the value of a barrel of oil is increased from 80 cents to about \$4.00 at wholesale prices. Thus, the value of our crude production is increased 500 per cent by the refineries in the State.

It is a matter of record that mineral development in the State has caused the incorporation of a large number of oil and mining companies under the laws of the State. Other companies doing business in the State are required to file copies of their incorporation papers and to pay fees accordingly. The fees for filing and incorporation of the oil and mining companies alone amount to many thousands of dollars annually.

FUTURE OUTLOOK FOR THE MINERAL INDUSTRIES

At no time in the history of Wyoming has the outlook for the future been so bright as at this time, especially in the oil and gas industries. The production of oil and gas in Wyoming is in comparatively early stages, i. e., the fields have, generally speaking, been depleted to only a very slight extent. The Salt Creek field, which has a pinched production of about 55,000 barrels per day, is good for a normal production of from 150,000 to 175,000 barrels per day. This means that under the present production regulations Salt Creek will continue to produce for a long period of time and thereby will greatly enrich the State. The pinching in of production may seem to be a hardship to some of the producers now and no doubt some of them need the proceeds from their oil very badly, but under the present market conditions and refining capacity no other course is practicable and by this means only will they avoid an expensive campaign of storage construction. The producers in Salt Creek have met this problem in a fair and business-like manner and have decided to discontinue all new drilling operations until May, 1923. By such action as this the life of the Salt Creek field will be extended over a great many years, the gas pressure will be conserved to a much greater extent which will make for economy in producing operations and will lessen the wastage due to over-production. Vast quantities of oil will be retained in the ground awaiting higher prices which must inevitably come in the next few years. The State of Wyoming will be immeasurably benefited by the retention of the oil in the underground reservoirs during this period of an overstocked market, both on account of the royalties received from State lands and its share of the royalties received from the Government lands. The cities of Wyoming, especially those containing oil refineries, will also be greatly benefited by curtailing oil production in times of depression and low prices. This makes for longer-lived fields and consequently a longer period of industrial activity in refining and allied industries.

Recent developments in the Teapot structure to the south of Salt Creek indicate an immense reservoir of oil therein and it is reported at this time that arrangements have been made and the pipe purchased for a pipe line from this field to the Seaboard lines in Kansas or northern Missouri. These activities are bound to create an era of prosperity in Wyoming.

New development in the Lost Soldier, Ferris and Mahoney fields indicates reserves of oil hitherto unsuspected. In the Lost Soldier field the drill has opened up a wonderful flow of oil from the Dakota sand; in the Ferris, the lower sand which formerly produced gas is now producing oil in 9 wells at the rate of 1,000 barrels per day; and oil has recently been discovered in the Mahoney dome which was thought to be a gas field only. Another pipe line is being built from the Ferris field to Grenville on the Union Pacific Railway and a refinery is being constructed at this place.

Brief mention should be made here of the encouraging outlook for "black oil" development in the State. Several new black oil fields have been brought in within the last two or three years, namely, Bolton Creek, Derby dome, both in Wyoming, and Soap Creek in Montana, which is near the Wyoming line. In the last named field oil was found in the Madison limestone, a formation which has never been tested in this State, and several structures are now being drilled here with the view of testing this horizon. West-central Wyoming, which contains the Hamilton, Warm Springs, Maverick Springs, Lander, Dallas and Derby black oil fields, in addition to other prospects, appears to be the logical location for a plant suitable for refining black oil and for manufacturing asphalt.

With a total daily production of about 85,000 barrels and a normal capacity of at least 200,000 barrels per day, Wyoming is in an enviable position to realize on her wonderful oil reserves in the near future or at such time when the world's market for gasoline and other oil products shall have returned to normal conditions.

The gas situation in Wyoming is also very encouraging. A number of our cities, such as Casper, Rawlins, Basin, Greybull, Lovell, Byron, Cowley, Thermopolis, Riverton and Lander, are now using natural gas and it is believed that a number of other towns will likewise have that privilege within a year. The oil companies are beginning to see the value of our natural gas reserves and are co-operating with this office to prevent wastage. In fact, a number of the oil companies are going into the gas business and are finding that it is as profitable, if not more so, than the oil business under present conditions. Formerly, the main idea was to get oil at whatever cost and, in case gas was discovered instead of oil, to allow the gas to escape into the atmosphere in the hope that the gas would blow itself out and oil would replace it. This attitude was totally wrong and was persistently combated by this office at all times. It is, therefore, exceedingly gratifying to state that there is practically no unavoidable waste in our natural gas fields to-day.

The new development in the southern gas fields, such as the Mahoney and Baxter Basin fields, is bound to result in a pipe line to some large center of population, probably either Salt Lake or Denver. In case the Denver line is projected, all of the cities in the southeastern part of Wyoming will be benefited; or in the other case, it will be the cities of southwestern Wyoming. Natural gas is an ideal fuel for domestic and industrial purposes and the more general use of it will result in the bringing in of sugar factories and many industries which are dependent on cheap fuel and the availability of raw materials, such as clay, limestone, potash, phosphates, etc.

This office is a clearing house for inquiries along these lines and disseminates information to all parts of the country with respect to our oil and gas fields, our coal, iron, clay and other mineral deposits and especially with respect to the availability of these deposits in connection with fuel, transportation and railroad facilities.

WYOMING'S UNDEVELOPED MINERAL RESOURCES

Our undeveloped natural resources are scarcely exceeded by those of any other State of the Union and of these the mineral resources are by far the most striking. Estimates of the intrinsic value of our great mineral resources would indeed be very crude and probably misleading. For in the present state of undevelopment there is no market for a great portion of our mineral deposits.

The coal measures of the State contain roughly 1,078,620,100,000 short tons of workable coal. The royalty value of this incomprehensible amount of coal at 10 cents per ton is \$107,862,010,000.00. It will be hundreds of years, however, before the bulk of this coal is mined.

With petroleum and gas it is somewhat different. The oil will be largely exhausted in the United States inside of 20 years and that is also probably true of the oil fields of Wyoming. In that time Wyoming may produce 500 million and possibly 600 million barrels of crude oil. The gas fields of this State appear to be practically inexhaustible, but of course they are not. They are capable of producing about 700 billion cubic feet of gas annually, while actual consumption is only 3 per cent of that amount. Much of this gas contains a high gasoline content. From 15 to 20 million gallons of casing-head gasoline are produced yearly, and this can be multiplied many times if industrial utilization of the resultant dry gas can be obtained.

Another vast, undeveloped source of crude oil, gas, and by-products is the oil shale. The formation in which our oil shale is found covers approximately 3,500 square miles of territory in southwestern Wyoming. Some of the deposits are rich in oil and assay one barrel or more of oil and considerable gas and ammonium sulphate to the ton of shale. It was estimated by the United States Geological Survey that the shale beds of northwestern Colorado, which are similar to those of Wyoming, are capable of producing 20 billion barrels of crude oil. If that is the case, undoubtedly Wyoming shales are capable of producing at least that

amount, when we consider that the shale area in Colorado is only 1,900 square miles as compared to 3,500 square miles in Wyoming, although Colorado shales may be somewhat richer in oil.

The State has also many other rich and undeveloped mineral deposits which include those of iron, copper, gold, silver and other precious metals, asbestos, asphalt, bentonite, clay, cement materials, epsomite, Fuller's earth, glass sand, granite and other building stones, graphite, gypsum, manganese, mica, mineral waters, phosphate, potash, salt, soda, and sulphur, all of which are described in Press Bulletin Number 10, published October 1, 1920, by this office.

The above matter is brought to your attention for the purpose of showing the importance of the mineral industries and the mineral resources to the public welfare and the very great part the industries will play in the future affairs of the State. It is meet, therefore, that the Department of State Geologist or Geological Survey should receive consideration from the legislative bodies commensurate with its important relationship to the development and conservation of the State's mineral resources.

MINERAL SURVEY OF STATE LANDS

For several years there has been a feeling in this office that there should be a systematic and thorough mineral survey of all State lands. In fact, such a mineral survey should cover the entire State, but this is an undertaking probably too stupendous to be thought of on account of the great expense involved. On the other hand a survey of the State lands would no doubt in time return to the State in revenues an amount greatly in excess of the expenditures involved therein. Such a survey cannot be made in one year or in several years, but would probably extend over a period of six, or eight, or possibly ten years. The importance of the State lands in Wyoming is indicated by the following figures:

Area of State lands.....	4,137,087.34 acres*
Average yearly income (Oil Royalty).....	\$1,125,000.00
Average yearly income (Coal Royalty).....	15,000.00
Average yearly income (Miscellaneous royalty —limestone, timber, etc.)	2,150.00
General rentals, yearly average prospector's leases.....	50,500.00
 Total	 \$1,192,650.00

*Approximately 400,000.00 acres sold without mineral reservations.

The revenues from State lands are constantly increasing and will increase for several years to come. As above shown, the principal revenues from State lands are now embraced in the oil royalties. In time, perhaps in 10 or 15 years, these royalties will dwindle to much smaller figures unless new fields are discovered to take the place of the ones now producing. We cannot reasonably expect that there will be new fields found in the State equal to those that are now being developed or to take the place of them. We do believe, however, that there are fields yet to be discovered and that it may be that such a survey, as is being suggested here, will be instrumental in showing the way to

such discoveries. If, on the other hand, extensive prospecting in the State does not tend materially to sustain the oil revenues of the State in the years to come, there is always the royalty from the coal and other minerals to fall back upon. A survey of State lands would serve as a basis for the renting, leasing or the sale of State lands, and the State Land Board in handling such matters would be largely guided by the information procured in this manner, not only as to any minerals that the land might contain, but as to the character of the surface, the soil and any improvements on the surface.

You will note that 400,000 acres of State lands have already been sold without mineral reservations. Mineral rights, if valuable, should remain the property of the State, when the land is sold; if not valuable, the title should be clear to the purchaser. A survey would settle the question of the mineral character and probable value of the land for minerals and would determine the status of the same, so that a prospective purchaser would be duly advised and would have no complaint on account of mineral reservations.

This information, if published, would undoubtedly lead to development and to increased revenues for the schools, university and other public institutions. This office daily receives inquiries as to the location of deposits of minerals such as asbestos, asphalt, bentonite, clay, cement materials, graphite, gypsum, mica, phosphate, potash, soda, and other little-known minerals which we are often unable to answer satisfactorily because of lack of information.

It is believed that a survey of this sort should be carried on under the direction of the State Geologist and that two or more parties should be put into the field every summer under competent field geologists and properly equipped for this kind of work. This matter is worthy of the most serious consideration by yourself and the legislative bodies and is brought to your attention more as a suggestion than as a recommendation.

In view of the general need for economy in all matters pertaining to the administration of the State offices, no recommendation is being made for an appropriation to cover this survey and the budget for this office does not include any estimates for the same. If, however, the Legislature sees fit upon the recommendation of the Governor to enact a law authorizing a mineral survey of State lands and to appropriate funds for that purpose, this office will be glad to co-operate and to submit estimates covering the proposed activities for the coming biennium.

CONCLUSION

It has been in the history of most of the States that the State Geological Surveys grow in size and importance with the development of the mineral industries. In fact, these Surveys have come to be looked upon as the pioneers and forerunners for the mineral industries and may be credited with bringing in no small amount of prosperity to the communities where their investigations have revealed the occurrence of valuable deposits and the practicability of their utilization. This is especially true of many of the states of the Middle West, where the mineral resources are neither so extensive nor so varied as those of Wyoming. Their mineral deposits consist mainly of limestone, sandstone, clay, coal, shale, gravel, sand, marl and in some cases oil, gas, iron, lead and zinc. Wyoming has nearly all of those resources and is much richer in many of them than the States of the Middle West.

Our disadvantage with respect to development lies in a small population and a consequent lack of capital and market. High freight rates are a handicap to producers in this State. Even under these conditions, however, it is thought that the office of State Geologist has not received the consideration by the Legislature that it should, if its importance may be measured by the importance of the subject with which it deals, namely, the development of the mineral industries of the State. The measure of the worth of any public institution is service. To give service, the office or department must have tools with which to work, which of course means money for investigations and for supervision and conservation.

In the foregoing we have attempted to outline to you the work that is being done by this office and the aims and the ambitions that we have to make this work more useful and beneficial, both to the State government and to the people of the State. We believe that we have given good service and that we will give better in the future. We also believe that the importance of the work is recognized by

the people of this State and that this work should be carried on and should embrace a wider scope of activities than has been possible in the past. The department of Oil and Gas Well Inspection has justified its existence and should be given a larger contingent fund for field expenses than heretofore. The nature of this work, which necessitates almost continuous traveling by motor car in all parts of the State, calls for larger expenditures than would be the case under normal conditions in other State Departments.

OIL REFINERIES IN WYOMING

Name of Company	Location	Capacity per day
Midwest Refining (Std. Oil Co. of Ind.)	Casper	50,000 bbls.
Midwest Refining (Std. Oil Co. of Ind.)	Greybull	12,000 bbls.
Midwest Refining (Std. Oil Co. of Ind.)	Laramie	4,000 bbls.
Mutual Oil	Glenrock	3,000 bbls.
Alliance Oil & Ref.	Thermopolis	1,500 bbls.
Riverton-Wyoming Ref.	Riverton	2,000 bbls.
Wind River Refining	Lander	1,000 bbls.
Northwestern Oil Ref.	Cowley	750 bbls.
General Pet. Corp.	Lovell	500 bbls.
Wyatt Oil & Ref.	Fetterman	500 bbls.
U. S. Oil & Ref.	Osage	200 bbls.
McWhorter Oil & Ref.	Lusk	200 bbls.
Osage-Upton Oil	Osage	100 bbls.
Clay Spur Refinery	Osage	100 bbls.
McAully Prod. & Ref.	Upton	100 bbls.
Southwestern Oil	Thornton	50 bbls.

UNDER CONSTRUCTION

The Texas Co.	Casper	6,000 bbls.
Producers & Refiners Corp.	Grenville	6,000 bbls.
	Total	88,000 bbls.

GASOLINE PLANTS IN WYOMING

Company	Location	Method	Capacity Cu. ft.	Yield per day Gallons
Midwest Ref.	Salt Creek	Compression	20,000,000	60,000
Midwest Ref.	Elk Basin	Compression	1,500,000	6,000
Ohio Oil	Grass Creek	Compression	750,000	2,000
E. T. Williams	Salt Creek	Compression	750,000	1,500
Wyo. Kans. Oil	Salt Creek	Absorption	500,000	1,000
Lovell Gasoline	Byron	Refrigeration	3,000,000	1,500
Armstrong Co.	Rock Creek	Pressure Abs.	3,000,000	3,000
Producers & Refiners	Wertz	Natural Condensation		4,000

UNDER CONSTRUCTION

(Probable yield)				
Producers & Refiners	Casper	Absorption	30,000,000	50,000
Producers & Refiners	Riverton	Absorption	6,000,000	3,000

PIPE LINES IN WYOMING

Company	Length	Size	From	To
Illinois Pipe Line	21.43 mi.	8 in.	Big Muddy	Casper
Illinois Pipe Line	49.35 mi.	8 in. }	Grass Creek	Greybull
Illinois Pipe Line	29.16 mi.	6 in. }		
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	43.30 mi.	6 in.	Lost Soldier	Ft. Steele
Illinois Pipe Line	21.40 mi.	4 in.	Midway	Ft. Steele
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 Line
Illinois Pipe Line	14.9 mi.	6 in.	Ferris	Separation Flats
Illinois Pipe Line	6.2 mi.	3 in.	Osage	Clay Spur
Illinois Pipe Line	9.7 mi.	6 in.	Cowley Jct.	Cowley
Midwest Refining	45. mi.	6 in.	Salt Creek	Casper
Midwest Refining	{ 26. mi. 8 in. }		Salt Creek	Casper
	{ 16. mi. 6 in. dbl. }			
Midwest Refining	40. mi.	3 in.	Salt Creek	Casper
Midwest Refining	40. mi.	4 in.	Salt Creek	Casper
Midwest Refining	{ 26. mi. 8 in. }		Salt Creek	Casper
	{ 16. mi. 6 in. dbl. }			
Natrona Pipe Line	45. mi.	6 in.	Salt Creek	Casper
Central Pipe Line	36.5 mi.	8 in.	Salt Creek	Casper
Western Pipe Line	{ 29. mi. 8 in. }		Salt Creek	Casper
	{ 14.8 mi. 6 in. dbl. }			
Ohio Oil	28.0 mi.	4 in.	Grass Creek	Chatham
Alliance Oil & Ref.	6. mi.	6 in.	Warm Springs	Thermopolis
General Petroleum	9. mi.	3 in.	Byron	Lovell
Occidental O. & G. Co. (Gas Line)	6. mi.	10 in.	Byron	Cowley
Lovell G. & E. (Gas Line)	8. mi.	5½ in.	Byron	Lovell
Midwest-Wyoming Gas (Gas Line)	35. mi.	8 in.	Hidden Dome	Greybull
Gallatin Natural Gas (gas line)	{ 3.72 mi. 8 in. }		Elk Basin	Billings, Mont.
	{ 29.2 mi. 10 in. }			
Rocky Mt. Gas (gas line)	{ 3.5 mi. 6 in. }		Byron	Powell
	{ 9.08 mi. 4 in. }			
Rocky Mt. Gas (Gas Line)	{ 4. mi. 4 in. }		Mahoney Dome	Rawlins
	24.3 mi. 6 in.			
Producers and Refiners and (Gas Line)	18. mi. 10 in.			
Midwest Refining	23. mi. 12 in.		Lost Soldier	Casper
Sand Draw Pipe Line (Gas Line)	23. mi. 6 in.		Sand Draw	Riverton
Sand Draw Pipe Line (gas line)	{ 12. mi. 6 in. }		Riverton	Lander
	{ 10. mi. 4 in. }			
The New York Oil (Gas Line)	28.5 mi. 8 in.			
	10 in. }		Poison Spider	Casper
	12 in. }			

UNDER CONSTRUCTION

Producers & Refiners	54. mi.	6 in.	Lost Soldier	Grenville
Midwest Refining	29.5 mi.	6 in.	Bolton Creek	Casper

ESTIMATED NATURAL GAS RESOURCES OF WYOMING

Field	County	Normal Daily Capacity in Millions of Cubic Feet
Garland } Byron }	Big Horn	10
Greybull } Lamb }	Big Horn	5
Elk Basin } Pole Cat }	Park	50
Oregon Basin	Park	75
Little Buffalo Basin	Park and Hot Springs	100
Hidden Dome	Washakie and Big Horn	25
Golden Eagle	Hot Springs	25
Big Sand Draw	Fremont	35
Alkali Butte	Fremont	5
Baxter Basin	Sweetwater	150
Powder R. Sta.) S. Casper Cr.) Poison Spider) Iron Creek)	Natrona	20
Mahoney) Ferris) Wetz) O'Brien Spgs.)	Carbon	150
Allen Lake	Carbon	25
Lance Creek	Niobrara	25
	Total	700

ESTIMATED COAL RESOURCES OF WYOMING

Green River Basin (Southwestern Wyoming)		Short Tons
Character		
Semi-Bituminous	-----	22,600,000
Bituminous	-----	174,138,000,000
Sub-Bituminous	-----	491,500,000,000
Total	-----	665,660,600,000
Big Horn and Wind River Basins (Northwestern Wyoming)		
Bituminous	-----	608,800,000
Sub-Bituminous	-----	3,467,700,000
Total	-----	4,076,500,000
Platte and Powder River Basins (Central and Northeastern Wyoming)		
Mainly Sub-Bituminous	-----	408,883,000,000
Grand Total	-----	1,078,620,100,000

ESTIMATED OIL RESOURCES OF WYOMING

Area	Bbbs. of Oil Recoverable
Southwestern Wyoming	250,000
Wind River Area	5,000,000
Big Horn Basin	20,000,000
Shoshone River Area	7,500,000
Central Wyoming	450,000,000
South Central Wyoming (Rawlins)	50,000,000
Laramie Basin	20,000,000
Eastern and Northeastern Wyoming	750,000
Total	553,500,000

Note:—The present production of crude oil in Wyoming is approximately 100,000 bbls. per day.

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- *Press Bull. 2, Rawlins and Vicinity: Morgan, Aug. 20, 1919.
- *Press Bull. 3, Rock Creek Oil Field: Morgan, Oct. 21, 1919.
- *Press Bull. 4, Laramie Basin: Morgan, Oct. 24, 1919.
- *Press Bull. 5, Wyoming Statutes Relating to Oil and Gas:
Morgan, Dec. 15, 1919.
- *Press Bull. 6, Lance Creek Oil Field: Morgan, Jan. 1, 1920.
- Press Bull. 7, Rock Creek 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. 12, Review of Oil Operations in the Laramie Basin:
Morgan, May 5, 1922.
- Press Bull. 13, Geology and Present Oil and Gas Development
of the Lost Soldier-Ferris-Mahoney District: Morgan, July
10, 1922.

*Out of print.

PRODUCING OIL AND GAS FIELDS

O. Oil.—G. Gas.

Southwestern Wyo. Area.	Central Wyoming Area.
Spring Valley, O.	Big Muddy, O.
Dry Piney, O.	Teapot, O.
Fossil, O.	Salt Creek, O. & G.
Baxter Basin, G.	Iron Creek, G.
La Barge, O.	Poison Spider, G. & O.
	Bates Hole, O.
	Powder River, G.
Wind River Area.	Pine Mt., G. & O.
Lander, O.	Douglas, O.
Dallas, O.	Shannon, O.
Derby, O.	S. Casper Cr., G.
Pilot Butte, O.	Bolton Cr., O.
Plunkett, O.	Boone Dome, G.
Maverick Springs, O.	Notches, O.
Big Sand Draw, G.	
Winkelman, G.	
Alkali Butte, G. & O.	
Sage Creek, O.	
	Rawlins Area.
Big Horn Basin.	Lost Soldier, O.
Grass Creek, O.	Wertz, G.
Torchlight, O.	Mahoney, G. & O.
Greybull, O.	Ferris, O. & G.
Warm Springs, O.	G. P. Dome, O.
Kirby Creek, O.	Buffalo Basin, G.
Little Buffalo Basin, G.	O'Brien Springs, G.
Hidden Dome, G.	
Golden Eagle, G.	Laramie Basin.
Murphy, G.	Rock Creek, O.
Hale, O.	Big Hollow, O.
Hamilton, O.	Allen Lake, G.
Crystal Creek, O.	
Spence, O.	Eastern Wyo. Area.
Lamb, G.	Lance Creek, O. & G.
Wagonhound, G.	Mule Creek, O.
Manderson, O.	Old Woman Creek, O.
Red Springs, O.	
Shoshone River Area.	
Elk Basin, O. & G.	Northeastern Wyo. Area.
Garland, G. & O.	Upton, O.
Oregon Basin, G.	Moorcroft, O.
Polecat, G.	Osage, O.
Byron, G.	Wakeman, O.

Note—There are 200 (approximately) known structures in Wyoming.

There are 68 structures producing or capable of producing oil or gas or both.

There are 8 structures being drilled at present time and 87 untested.

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				White River		Undifferentiated	White River		Ogallala Arikaree Brule Clay Chadron	
		Knight Fowkes Almy	Wind River	Wasatch	Wasatch	Wind River	Wasatch					
		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)		Pierre		Steele (Shannon sand)	Pierre	Steele	Pierre	Pierre	Pierre	Pierre
				Basin (Niobrara)	Cody	Niobrara	Niobrara	Niobrara	Niobrara	Niobrara	Niobrara	Niobrara
	Colorado	Frontier	Mancos	Frontier (Torchlight-Peay sands)	Frontier (sands)	Frontier (Wall Creek sands)	Frontier (Wall Creek sands)		Carlile	Carlile	Carlile	
				Aspen	Mowry (Kimball sand) (Oeth Louie sand)	Mowry	Mowry	Mowry (Shale & sand)	Benton (Frontier sands) (Mowry Shale)	Graneros (Mowry shale) (Newcastle sand)	Graneros (Mowry shale) (Newcastle sand)	Benton (Mowry shale)
				Thermopolis	Thermopolis (sand)	Thermopolis (sand)		(Muddy sand)	(Muddy sand)			
		Lower Cretaceous		Bear River	Dakota (sand) (shale & sand)	Cloverly (Greybull sands)	Cloverly (Greybull sands)	Dakota (sands)	Dakota (sands)	Cloverly (sands)	Dakota Fuson Lakota	Dakota Fuson Lakota
	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)			Minnekahta Opeche	Minnekahta Opeche		
Pennsylvanian (Carboniferous)		Weber		Tensleep Amsden		Tensleep Amsden	Casper	Forelle Satanka Casper	Hartville	Minnelusa	Casper	
Mississippian (Carboniferous)				Madison		Madison			Guernsey	Pahasapa		

