

REPORT

OF THE

✧ Coal Mine Inspector

FOR THE

STATE OF UTAH

For the Years 1905 and 1906.

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SALT LAKE CITY  
THE DESERET NEWS

1907.  
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Gomer Thomas, State Coal Mine Inspector of Utah.

*To His Excellency, John C. Cutler,  
Governor of State of Utah.*

DEAR SIR:—I have the honor to submit herewith my report as State Coal Mine Inspector for the year ending November 30th, 1905.

Respectfully yours,

GOMER THOMAS,  
State Coal Mine Inspector.

REPORT OF  
State Coal Mine Inspector  
FOR 1905.

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The year 1905 was the most prosperous, for all interested in mining coal, of any year since mining commenced in Utah, and it would have been far more prosperous had the Railroad efficient equipment to handle the coal, and the Mine Officials having a scarcity of miners, could not comply with the great demand for coal.

During the year just ended, relation between the employer and employee have been most cordial, governed by natural confidence and showing the most friendly feeling and sympathy. There have been no labor troubles or dissensions, and the Mine Owners, have liberally shared with the workmen the profits from their mines, paying them satisfactory wages, and afford them nearly steady employment to the utmost of their ability, special care has been taken by the mine owners and local management to protect the workmen from injury to body or danger of death. They endeavor to comply with all State Laws on this subject, and do not hesitate, to incur any additional expense to secure additional safety, to that required to fulfill the legal requirements.

The number of accidents resulting fatally, or in serious injuries, while low in comparison with other States, is no doubt much higher than it would be if the workmen were of a more careful class, and take up the opportunities offered them, and were able to co-operate with their employers in their efforts to provide for their safety, it must be born in mind that of the large number employed in coal mining in Carbon County.

nearly one half are foreigners, unable to speak our language, and men who have not been trained to exercise care, even for their own protection. But they require the constant care of those placed over them to protect their health and lives.

During the year there were seven accidents resulting fatal and thirty six causing severe injury. I made thorough personal investigation into the circumstances surrounding these occurrences, and the causes leading up to the same.

I have submitted detailed to the Governor's office which are on file there, and to which I refer, it will appear from these reports that in most every instance the unfortunate occurrence was caused by the persistent neglect of the miner to make use of the facilities providing for his own safety placed on hand by his employer.

We know this is largely due to the fact that the men are of the above named class and are hard to convince that any precautions are necessary on their part.

In addition to this, I have made a great number of inspections during the year in excess to them as required by law, to familiarize myself with the schemes, plans and development of the different mines, and with the systems of drainage, ventilation, lighting employed, and I am satisfied, that local conditions considered, the mines are fully up to the standard required. It has been my intention to have them excel rather than fall short of those requirements and in this work I have received at all times the hearty co-operation of all concerned.

I have by careful examination, satisfied myself of the practical knowledge of the mine foremen, and their fitness for their position and have met with the support of the mine owners and management in my efforts to see that only those best qualified with the longest practical knowledge, and good judgment, hold positions which place under their care, the lives and health of the workmen. The system of promoting efficient, practical miners to those positions, is proving its worth, and nothing has ever occurred in my judgment that would justify its abandonment and the substitution of the theoretical training for practical knowledge.

The production of Coal in 1905 was 1,602,528 short tons, at a value of \$1,890,983.04, average per ton \$1.18 on cars at mine, showing an increase of 39,254 short tons over 1904, the amount of coke produced was 215,712 short tons with an increase of 30,695 short tons.

There has been a large amount of Gilsonite, Ozokerite, Elaterite and Asphaltum mined in the State during 1905. As to the amount I am unable to state as I could not obtain the proper data.

The number of employees in and around the coal mines was 1,963 a decrease of 252, the number of men employed in and about the Hydro-Carbon mines was 386. The average amount of Coal mined for each man employed in the coal mines was 816 short tons. The number of fatalities to every 1000 men employed is 3.35. Amount of coal mined for each life lost 228,932 short tons. The amount of high explosive used in the coal mines of the State was, black powder 150,642 pounds, dynamite 83,692 pounds. Or one pound to every 6½ short tons of coal.

#### FATAL ACCIDENTS.

It will be seen by noting the causes of accidents, here reported, that a large percentage, might have been avoided by the exercising of ordinary care on the part of those who have been killed, however, there does not appear to be any method or argument that can be advanced which will induce the miner and the workman to take proper precaution to secure their own safety. Causes of accidents are follows:

Fall of roof or coal.....	3
Falling down shaft.....	1
Run over by car on Railroad.....	1
Run over by car in Mine.....	1
Run over by Railroad Locomotive.....	1

Total.....7

Four were killed in the coal mines.

I would suggest to the Honorable Legislature of the State of Utah, which meets in January, 1907, that they make an amendment to the Coal and Hydro-Carbon

Mining Laws of the State of Utah, as follows: That it shall be unlawful for any miner or any employee in the Coal and Hydro-Carbon Mines of the State to use or set off any high explosive for the mining of coal or taking down rock during the working hours, as all shots must be fired after the men are all out of the mine excepting those that will be needed to fire the same.

My reasons for the above suggestion is, that the men employed in the mines are allowed to use explosives which causes the air in the mine to become vitiated by the unnecessary use of powder for blasting off the coal. As in some of our large mines they are shooting and using powder throughout the day.

Other reasons are, that the great source of danger comes from the use of powder such as blow out shots, etc. As nearly all of our explosions come through this source, especially where a mine is dry and dusty. Hoping the honorable body will take this matter up as it is one of the most needed amendments to-day.

William Sidwell, a stableman, age 55, was killed at Winter Quarters Mine, January 5th, 1905. Directly in front of power house on railroad track. Right leg crushed through between knee and ankle, injuries from which he died at St. Marks Hospital, Salt Lake City.

At the time of the accident Sidwell had been to the company stable and was returning home, walking on main side track, when near the power house he was knocked down and his leg run over by locomotive engine 704 which had been taking coal at the chute and was backing down when accident occurred.

#### FATAL ACCIDENTS.

Elijah Turner, a Miner, age 45, was killed in the Grass Creek Mine, February 6th, 1905, Right thigh bone broken slight scratch on head, body slightly bruised.

At the time of accident Mr. Turner was loading a car at the face of his room, when part of a loose slab of coal fell over him, bending his head to the floor and breaking his thigh bone, from which he died in three or four days.

Thomas Blundell, age 28, a miner, was killed in the Colton Wax Mine on April 18th, 1905. Blundell was let down to the 45 foot level in the bucket with the hoist and after landing on the 45 foot level gave a signal showing that he had safely landed. A few minutes afterwards his body was discovered by other workmen in the bottom of the shaft at the 100 foot level. Nothing is known as to the cause of the accident and we can only conjecture that he was attempting to cross the shaft to go into the north drift for the purpose of obtaining specimens and failed to close the trap door but attempted to cross the shaft on the bucket which was then swinging at the 45 foot level. In falling Blundell's neck was broken.

James Benedetta, a miner, age 36, was killed in the Sunnyside Mine number 1 on April 25th, 1905. A piece of rock averaging from two to three inches in thickness and nearly five feet long, about three feet wide fell from roof of his working place striking him on the back, forcing him down against the pick handle with which he was working, Ribs broken and pushed into his lungs causing death a few hours afterwards.

James Smith, a driver, age 18, was killed in the Winter Quarters Mine on August 11th, 1905. Smith was making his last trip for the day and was riding on the shaft in front of three cars when the car next to horse became derailed, jamming Smith between mine prop and end of mine car. Causing injuries from which he died three hours after accident occurred.

Jos. M. Soye, a miner, age 24, was killed in the Sunnyside Mine number 2 on September 9th, 1905. At the time of accident Soye and his partner Frank Sajz, were working at the face of their room, Sajz had gone back from the face to get a sharp pick, when coal fell from the roof from a smooth slip. Causing injuries from which he died a few hours afterwards.

Sam Pascoe, a car dropper, was killed at Sunnyside Mine, on November 20th, 1905. Pascoe at the time of accident was dropping a railroad car which was partly loaded and while doing so the back chain broke and Pascoe fell in front of Car. The whels passing



over his legs cutting them off and mangling his body, causing his death.

#### SERIOUS ACCIDENTS FOR 1905.

Joseph Barber, a miner, aged 52, was injured in the Grass Creek Mine on January 14. At the time of the accident Mr. Barber and his partner James Richards, were busy loading a car, when a piece of coal 3 ft. long and 15 inches thick fell from the roof striking Mr. Barber, injuring him as follows: Scalp wound on head, shoulder bruised and right ankle broken at ankle joint.

Orson Moved, a driver, age 22 was injured at the Clear Creek mine on May 5, 1905. At the time of the accident Moved was driving along entry towards room 18 when car jumped the track and throwing the driver against the prop from which the following injuries resulted: Four ribs broken on left side and bruised on left arm and shoulder.

George Busenbark, a miner, age 32, was injured in the Winter Quarters Mine on May 6, 1905. Busenbark was engaged in helping to place a loaded mine car upon the track when a piece of clod which his partner had attempted to take down but thought it would stay until the car was loaded, fell from roof striking car and rolling down struck Busenbark causing the following injuries; Bruised on upper part of back, hips and right foot and partial paralysis of legs.

Antonio Sacaminoni, a miner, age 37, was injured in the Clear Creek Mine on May 11, 1905. At the time of the accident he was tamping a shot in his room when a piece of coal fell from the roof striking him on the head knocking him down and breaking his leg.

John A. Newrea a waterman age 57, was injured in the Winter Quarters Mine on June 14, 1905. At the time of accident Newrea was going along the entry when he was knocked down by a horse and trip of cars fracturing his right collar bone, two ribs on right side, and one rib on left side fractured. little finger on left hand broken, left hand badly cut and bruised.

TABLE SHOWING THE COAL PRODUCTION IN THE STATE  
OF UTAH FROM 1876 TO 1905, INCLUSIVE.

YEAR	NO. TONS PRODUCED	GAIN	LOSS
1876	50,400	.. . . .	.. . . .
1877	50,400	.. . . .	.. . . .
1878	67,200	16,800	.. . . .
1879	225,000	157,800	.. . . .
1880	225,800	.. . . .	.. . . .
1881	250,000	25,000	.. . . .
1882	250,000	.. . . .	.. . . .
1883	250,000	.. . . .	.. . . .
1884	250,000	.. . . .	.. . . .
1885	213,120	.. . . .	36,880
1886	200,000	.. . . .	13,120
1887	180,020	.. . . .	19,980
1888	259,501	79,500	.. . . .
1889	236,651	.. . . .	22,850
1890	318,159	81,508	.. . . .
1891	371,045	52,886	.. . . .
1892	361,314	.. . . .	9,731
1893	418,049	56,735	.. . . .
1894	447,276	59,227	.. . . .
1895	172,958	.. . . .	274,328
1896	503,243	330,285	.. . . .
1897	582,092	78,849	.. . . .
1898	673,297	91,205	.. . . .
1899	878,122	204,826	.. . . .
1900	1,233,978	456,856	.. . . .
1901	1,382,470	148,492	.. . . .
1902	1,641,436	258,966	.. . . .
1903	1,782,178	120,742	.. . . .
1904	1,563,274	.. . . .	198,904
1905	1,602,528	39,350	.. . . .

PRODUCTION OF COAL, COKE AND ASPHALTUM.  
IMPORTED, EXPORTED AND CONSUMPTION OF SAME IN  
UTAH FOR 1905.

Production,.....	Bituminous, 1,602,528	Coke, 215,712	Gilsonite, .....
Imported, .....	365,677	" .....	" .....
Total, .....	1,968,205	" .....	" .....
Exported, .....	337,613	" 56,725	" .....
Consumed in Salt Lake, 1905,.....	Bituminous, 218,495		
" " " 1904,.....	" 214,369		

TOTAL PRODUCTION OF COAL IN UTAH DURING THE  
YEAR 1905, BY COUNTIES.

Carbon. ....	1,444,565
Summit .....	74,911
Sanpete .....	4,202
Emery .....	3,500
Other Small Mines .....	75,350
<b>Total .....</b>	<b>1,602,528</b>

COAL PRODUCED IN THE SEVERAL MINES IN UTAH  
FOR 1905.

NAME OF MINE	OPERATED BY	NO. OF SHORT TONS
Winter Quarters.....	P. V. Coal Company.....	256,550
Clear Creek.....	P. V. Coal Company.....	304,025
Castle Gate.....	P. V. Coal Company.....	243,556
Sunnyside.....	Utah Fuel Company.....	639,934
Grass Creek.....	Grass Creek Coal Company..	40,561
Wasatch.....	Weber Coal Company.....	34,350
Other Small Mines.....	.....	83,552
<b>Total.....</b>	.....	<b>1,602,528</b>

TABLE SHOWING NUMBER OF TONS PRODUCED, NUMBER OF DAYS WORKED, NUMBER OF MEN EMPLOYED, NUMBER OF PERSONS KILLED AND INJURED, AND NUMBER OF POUNDS OF POWDER USED, ETC.

NAME OF MINE	Counties	Short Tons of Coal	Tons of Coke	Days Worked	Men Employed	Fatal Accidents	Non-fatal Accidents	Pounds of Powder	Pounds of Dynamite	Mules and Horses	Steam Boilers	Locomotives	Coke Ovens
Winter Quarters.....	Carbon .....	354,550		227	398			58,272					
Castle Gate.....	Carbon .....	243,556	83,348	232	411				40,367				24
Clear Creek.....	Carbon .....	304,025		271	285			64,323					
Sunnyside.....	Carbon .....	670,874	132,364	275	468	2	2,113		43,325		25-3-10	1	50
Aberdeen.....	Carbon .....	500		75	2			225					
Grass Creek.....	Summit.....	47,581		275	52		1	15,480		10			
Wasatch.....	Summit.....	44,350		258	42		2	2,850		2			
Huntington.....	Emery.....	2,000		75	2			1,800					
Cedar Creek.....	Emery.....	1,500		75	4			1,200					
Thomas.....	Sanpete.....	4,222		270	12			700					
Other Small Mines.....		75,250		240	125	1		5,300		13			
<b>Total.....</b>		<b>1,802,228</b>	<b>215,712</b>	<b>2,376</b>	<b>1,958</b>	<b>7</b>	<b>21</b>	<b>150,642</b>	<b>23,862</b>	<b>187</b>	<b>50</b>	<b>2</b>	<b>74</b>

TABLE SHOWING TONNAGE BY COUNTIES FOR 1905 COMPARED WITH 1904.

Counties.	Tons for 1905	Tons for 1904	Gain	Loss
Carbon .....	1,444,565	1,408,372	36,193	
Summit.....	74,911	68,719	6,192	
Sanpete .....	4,202	6,033		1,831
Emery.....	3,500	2,750	750	
Other Small Mines.....	75,350	77,400		2,050
Totals .....	1,602,528	1,563,274	43,135	3,881
Gain, Short Tons.....			39,254	

TABLE SHOWING PRODUCTION OF COAL IN UTAH DURING YEAR 1905.

Counties.	Total Production in Short Tons.	Total Production of Coke.	Average Per Ton.	Days Worked.	Employees.
Carbon.....	1,444,565	215,712	\$1.18	1,935	1,722
Summit .....	74,911		1.17	511	94
Sanpete.....	4,202		1.45	270	12
Emery.....	3,500		1.00	150	10
Other Small Mines.....	76,350		1.00	210	125
Totals .....	1,002,528	215,712	\$1.16	2,376	1,963

TABLE SHOWING NUMBER OF MEN EMPLOYED IN COUNTIES IN 1805 COMPARED WITH 1904.

Counties.	1904	1905	Gain	Loss
Carbon .....	1,967	1,722		245
Summit .....	100	94		6
Sanpete .....	20	12		8
Emery .....	15	10		5
Other Small Mines.....	90	125	35	
Totals.....	2,215	1,963	35	264

TABLE SHOWING NUMBER OF LARGE AND SMALL MINES IN THE STATE AND THE NUMBER OF EACH THAT WERE IN OPERATION DURING 1905.

COUNTIES.	Number of Mines which Employed More than 6 Men.	Number of Mines which Employed Less than 6 Men.	Total by Counties.	Number of Large Mines in Operation in 1905.	Number of Small Mines in Operation in 1905.	Total Number of Mines in Operation in 1905.
Carbon.....	8	38	58	12	50	58
Summit.....	1	3	4	1	3	4
Sanpete.....		25	25		25	25
Uintah.....		42	42		42	42
Emery.....		15	15		15	15
Iron.....						
Total.....						151



TABLE SHOWING NUMBER OF FATAL, SERIOUS AND NON-SERIOUS ACCIDENTS AND THE COUNTY IN WHICH THE SAME OCCURRED DURING 1905.

COUNTIES	Fatal	Serious	Non-Serious	Total
Carbon .....	5	10	23	38
Summit .....	1	1	2	4
Emery .....				
Sanpete .....				
Wasatch .....	1			1

TABLE SHOWING CASUALTIES OF 1905 COMPARED WITH 1904.

COUNTIES	1904			1905				
	Fatal	Non-fatal	Total	Fatal	Non-fatal	Total	Gain	Loss
Carbon .....	8	56	64	5	33	38		26
Summit .....	1	2	3	1	3	4	1	
Sanpete .....								
Wasatch.....	1		1	1		1		

TABLE SHOWING THE NUMBER OF MINES EMPLOYING  
THE DIFFERENT METHODS OF VENTILATING AND  
THE KIND OF OPENING.

COUNTIES	Character of Opening			Mode of Ventilation		
	Drift	Slope	Total	Fan	Furnace	Natural
Carbon.....	56	2	58	9	1	49
Summit.....	8	2	10	2	.....	8
Emery.....	34	.....	34	.....	.....	34
Sanpete.....	4	2	6	.....	.....	6
Uintah.....	25	.....	25	.....	.....	25
Iron.....	15	.....	15	.....	.....	15

TABLE SHOWING COMPARATIVELY THE NUMBER OF MINES IN OPERATION AND THE NUMBER OF DAYS WORKED IN 1904 AND 1905.

COUNTIES	Number of Mines in Operation in 1904.	Number of Mines in Operation in 1905.	Gain.	Loss.	Average Number Days Worked in 1904.	Average Number Days Worked in 1905.	Gain.	Loss.
Carbon.....	58	58	.....	.....	.....	.....	.....	.....
Summit.....	5	5	.....	.....	.....	.....	.....	.....
Saopete.....	6	6	.....	.....	.....	.....	.....	.....
Utintah.....	34	25	.....	9	.....	.....	.....	9
Emery.....	42	42	.....	.....	.....	.....	5	.....
Iron.....	10	15	.....	.....	278	249	.....	27

TABLE SHOWING PRODUCTION OF COAL, NUMBER OF POUNDS OF POWDER USED, NUMBER OF FATAL AND NON-FATAL ACCIDENTS, NUMBER OF DAYS WORKED AND NATIONALITIES OF MEN EMPLOYED BY THE UTAH FUEL AND P. V. COAL COMPANIES.

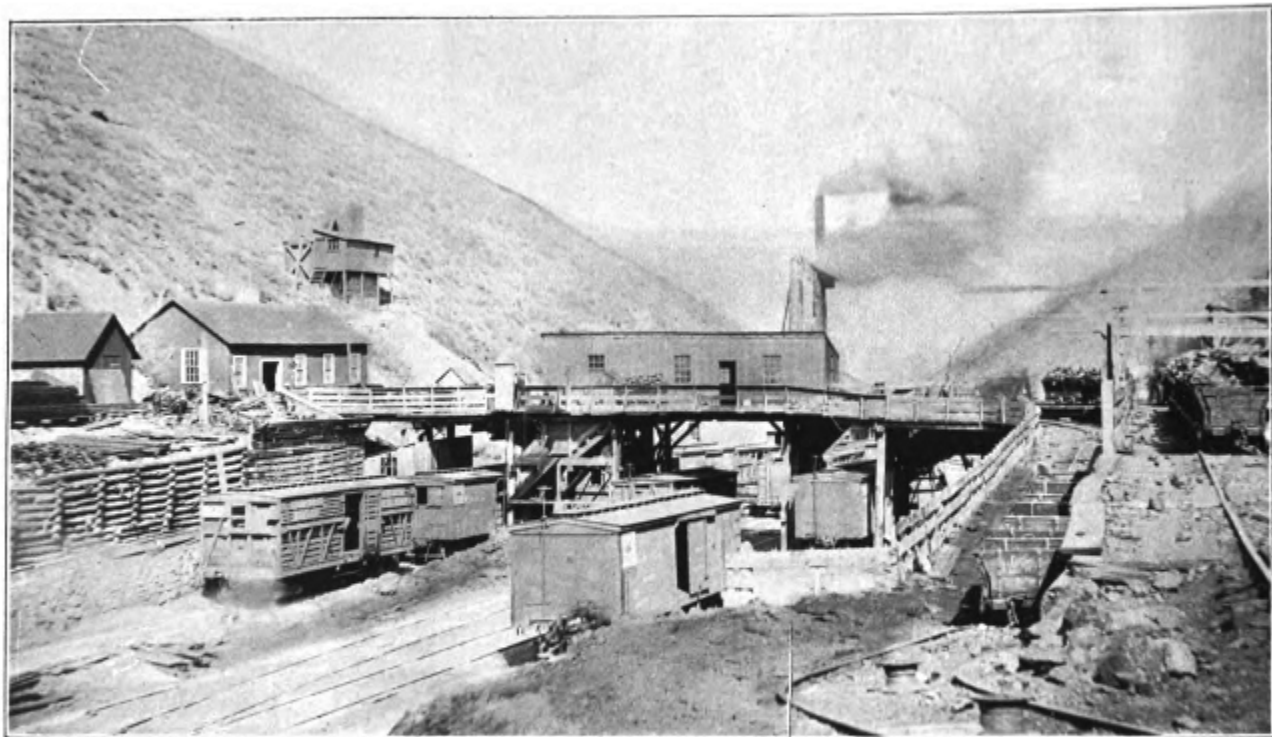
Coal produced .....	1,444,065
Coke.....	215,712
Average days worked.....	249
Men employed . . . . .	1,720
Fatal. . . . .	5
Non-Fatal.....	33
Pounds of Powder....	206,259

NATIONALITIES.

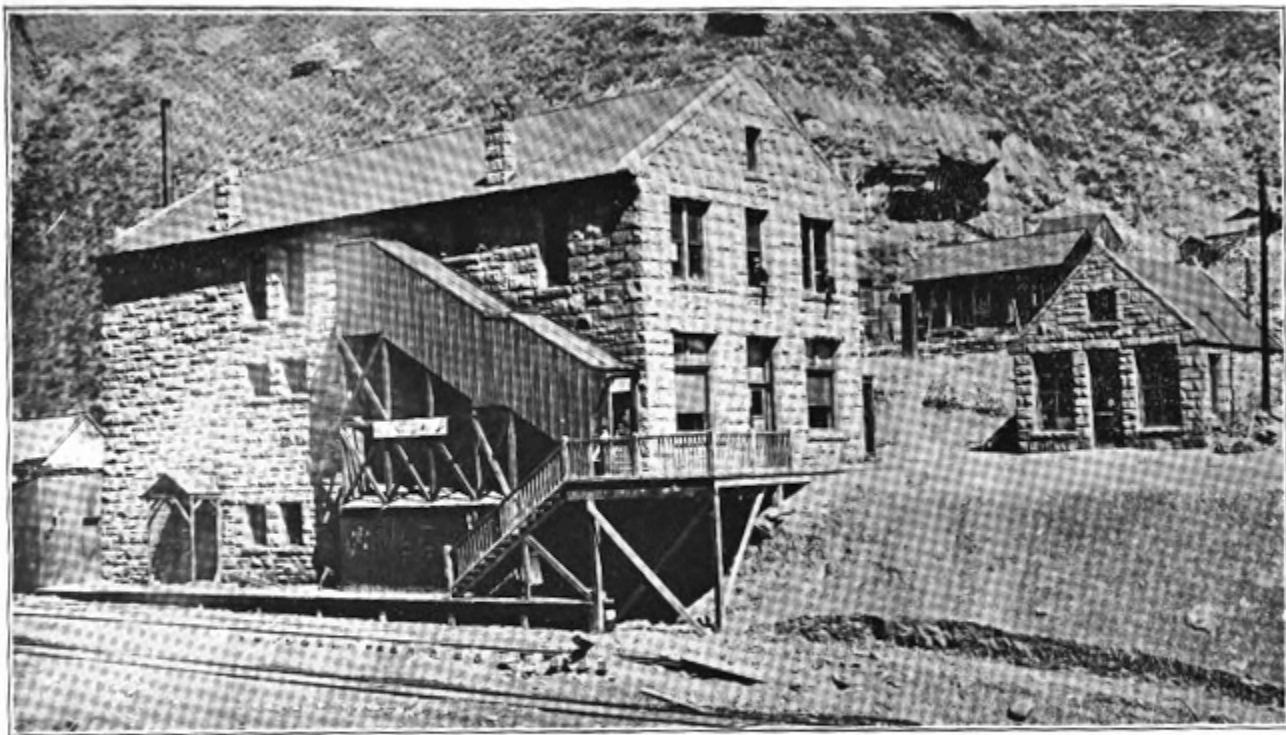
Americans. ....	879
German.....	54
Finn .....	157
Italian .....	171
Austrians .....	260
Swede .....	7
French .....	16
Greek. ....	111
Slavs .....	3
Negroes....	14
Spanish .....	
Mexicans .....	2
Japanese.....	46
Chinese....	

TABLE SHOWING LOCATION, ETC., OF MINES IN UTAH.

NAME OF MINE	NAME OF OPERATOR	COUNTY	NAME OF SUPT.	P. O. ADDRESS.
Winter Quarters.....	P. V. Coal Co.....	Carbon.....	T. J. Parmley.....	Seofield.....
Clear Creek.....	P. V. Coal Co.....	Carbon.....	Wm. Forrester.....	Clear Creek.....
Castle Gate.....	P. V. Coal Co.....	Carbon.....	W. J. Elwood.....	Castle Gate.....
Sunnyside.....	Utah Fuel Co.....	Carbon.....	Robert Howard.....	Sunnyside.....
Aberdeen.....	Whittemore & Ballinger.....	Carbon.....	A. Ballinger.....	Price.....
Grass Creek.....	Grass Creek Coal Co.....	Summit.....	John E. Pettit.....	Coalville.....
Wasatch.....	Weber Coal Co.....	Summit.....	T. J. Lewis.....	Coalville.....
Huntington.....	P. V. Coal Co.....	Emery.....	Wm. Forrester.....	Clear Creek.....
Deseret.....	Kemmerer Coal Co.....	Emery.....	Thos. D. Reese.....	Wales.....
Cedar Creek.....	Cedar Creek Coal Co.....	Emery.....	Wm. Howard.....	Huntington.....
Thomas.....	Sterling Coal Co.....	Sanpete.....	H. Thomas.....	Manti.....
Huntington Creek.....	Don C. Robbins Coal Co.....	Emery.....	D. C. Robbins.....	Salt Lake City.....
Anthracite Coal Co.....	Anthracite Coal Co.....	Iron.....	Robert Kirker.....	Salt Lake City.....



Bridge at Winter Quarters.



Winter Quarters Store and Office.

## WINTER QUARTERS MINE.

Located at Winter Quarters, the Colton and Scofield branch of the Rio Grande Western. The mine is worked by a drift and is ventilated by artificial ventilation, power used for haulage is electricity, the haulage on the main haulage road is done by an electric locomotive, all main entries are lighted by electric light.

The seam of coal which is worked in this mine has a thickness of 9 to 12 feet. The roof is not of the best kind, as there is a clod of 6 to 10 inches next to the coal, which is hard to keep up. The coal is mined with picks.

Oils used in this mine meets with the requirements of the law. Rules are posted at the mine. The output for this mine for the year was 256,550 short tons, consuming 58,242 pounds of black powder and employing 386 men.

Thomas J. Pamsley, mine superintendent. Henry Pamsley, mine foreman.

My first official visit of inspection to this mine was on January 17 and 18, 1905. I found the mine in a fairly good condition, well timbered, watered and ventilated.

My next official visit to this mine was on March 24 and 15. I went through the mine with the mine superintendent, and am pleased to say that I found the mine in a far better condition than it has been for a long time.

My next official visit of inspection to this mine was in the fore part of the quarter ending June 20. I went through the mine and found it in a fairly good condition, with good ventilation, all places well timbered and kept damp.

My next official visit to this mine was on August 11, 1905. I went through part of the mine and found it in fairly good condition.

On August 12th I went in the mine and visited the place of accident where James Smith got hurt the day before, from which cause he died a few hours later. As I looked over the place of accident I found the cars had jumped the track, and James Smith, who was a driver, was riding on the front end of the front car on the shaft, when the car jumped the track, He was



found between the prop and the car. I looked over the track and measured the gauge and found it to be all right. The grade at that point was nearly two per cent. I measured the distance from the rail to the timber on the side that Mr. Smith got hurt, it was 2 feet 3 inches, on the other side it was 2 feet 10 inches between the track and the timber. The height at this point was 6 feet from the rail to the bottom of the cap piece. In my opinion, by carefully looking over the condition for 100 feet outside the place of accident, I find that the car on the last empty trip going in was off the track, and it may have been possible that it had thrown coal or dirt on the track, and when Smith came with a loaded trip—and as near as I can find out he was coming out a little fast, as it was the last trip for the day, and it is generally the rule to make the last trip in a hurry—this, as near as I can see, was the cause of the accident.

I made other visits to this mine and found it in general in good condition.

#### CLEAR CREEK MINE.

This mine is owned and operated by the P. V. Coal Company, and is situated about six miles south of Scofield, on a branch of the R. G. W. R. R.

The output of this mine for the year 1905 was 304,025 short tons of coal, at a cost of \$1.18 per ton. Total value of product \$ , consuming 64,325 pounds of powder, employing 285 men and 25 mules and horses; mine worked 230 days.

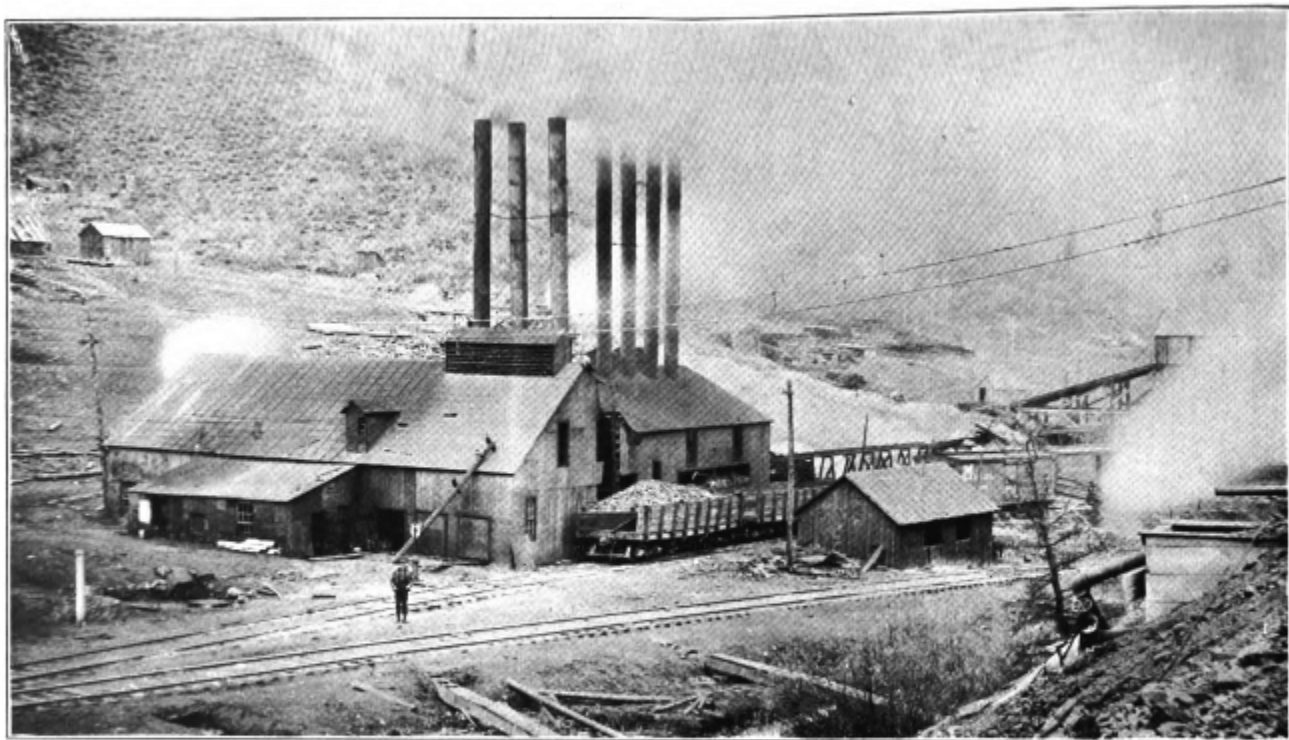
This mine is worked by a drift and has artificial ventilation, being ventilated by a fan which produces 94,384 cubic feet of air per minute at the intake and 98,301 cubic feet at the outlet. All haulage done by means of a tail rope. The pumps are run by compressed air.

My first official visit to this mine was on January 24 and 25, 1905. I found the mine in a fairly good condition, well timbered and damp, with good ventilation.

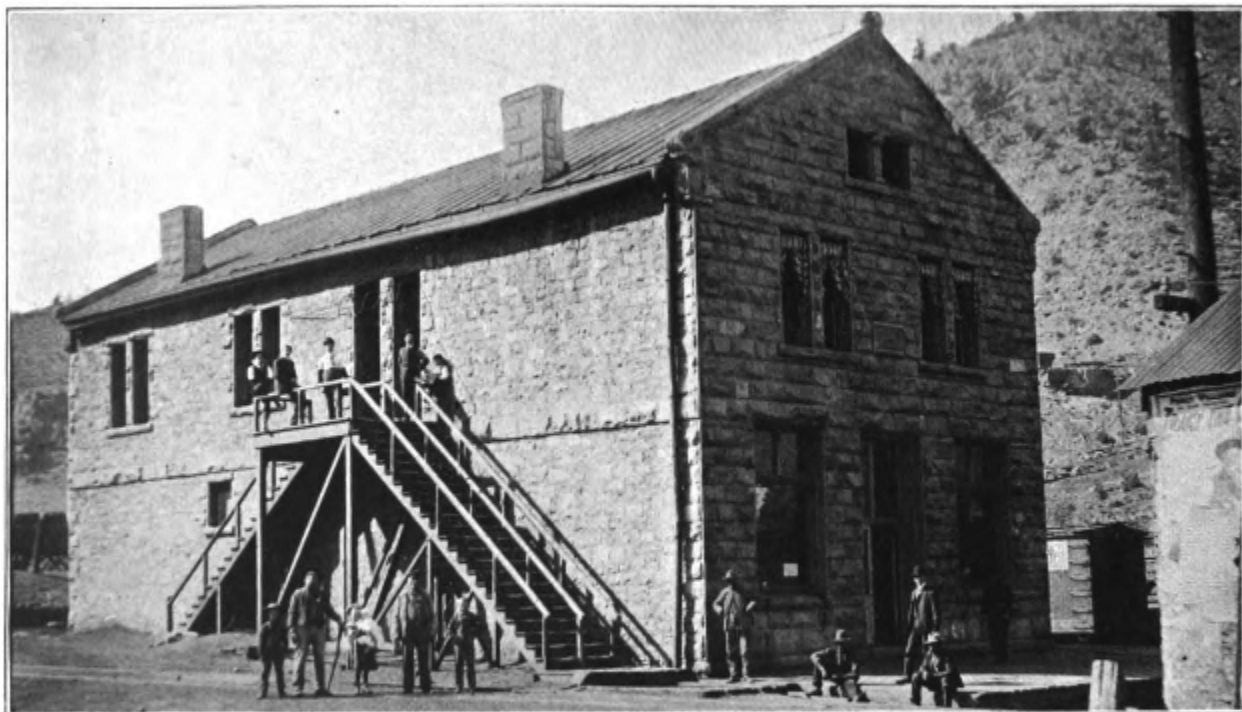
My next official visit was on March 22 and 23. I went through the mine and found it in a better condition than on my last visit, with the exception of infe-



Company House at Winter Quarters.



Power House at Clear Creek.



Store and Office at Castle Gate.

or oil, which was used mostly by day men. I notified the mine foreman to see to this at once as the new law is in force.

My next official visit to this mine was on May 3. I went through the mine and found all places in a good, safe condition.

I made other visits to this mine and found it in about the same condition as above.

Wm. Forrester, mine superintendent. James Russell, mine foreman. T. W. Thomas, assistant mine foreman.

#### CASTLE GATE MINE.

The Castle Gate Mine is the property of the P. V. Coal Company and is located 110 miles southeast of Salt Lake City on the main line of the R. G. W. R. R.

The amount of coal produced in 1905 was 243,556 short tons, consuming 40,367 pounds of dynamite; coke made from Sunnyside coal, 83,348 short tons, employed 401 men in and around the mine and 17 mules, working 232 days, one fatal accident, 13 non-fatal.

The mine is worked by a drift and is ventilated by artificial ventilation. All the main haulage ways are lighted by electric light. There are telephone connections on the main entry with the company's office.

My first official visit to this mine was on February 13 and 14. I went through the mine and found everything in a fairly good condition, all places well watered and kept damp, with good ventilation and well-timbered I consider the mine in a good, safe condition.

My next official visit was on April 24th and 25th. I went through the mine and found it well watered with the exception of a few places which were dry.

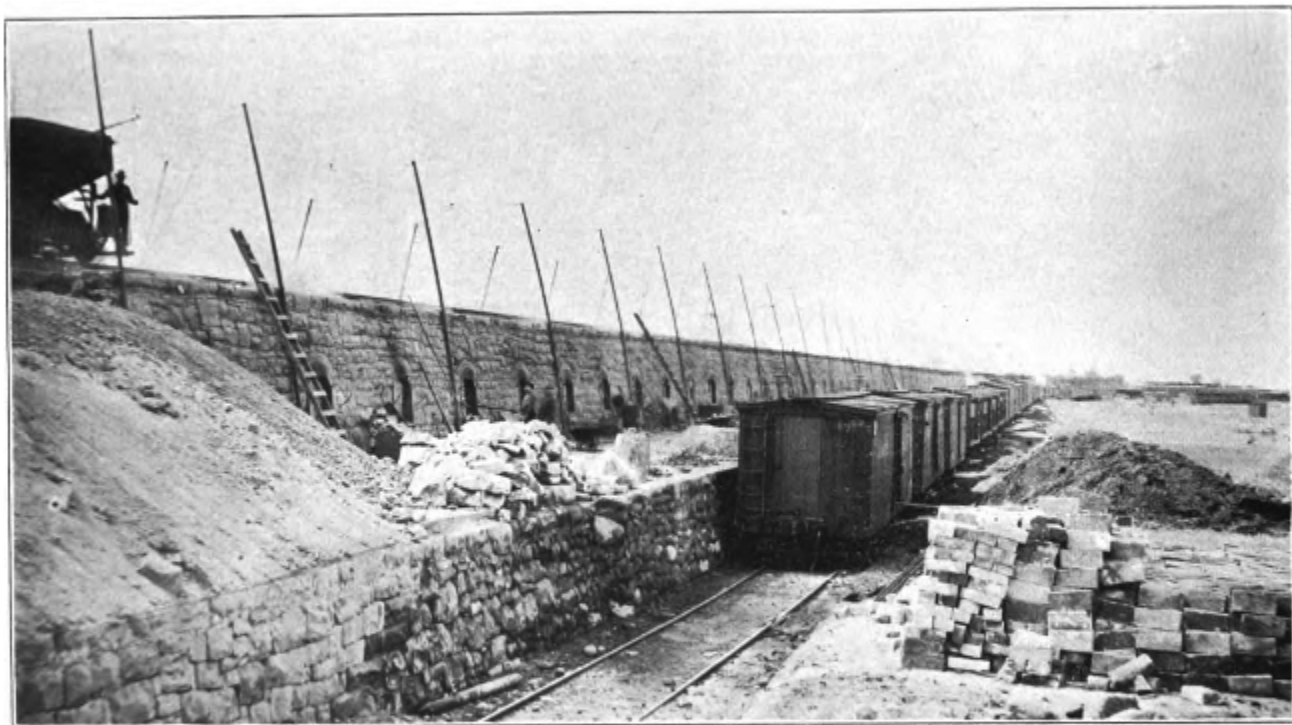
The ventilation and timbering were good. I found the return airway close to the fan was in a bad condition on account of the washout in the ravine above, which had caused the ground to move and break in the timber, this part of the return airway has made more or less trouble for several years. My suggestion would be to start a new air course outside of the three doors and come in around the doors and come

through right opposite the fan and drive from there on to the first raise which would do away with all this bad ground. I would leave 60 feet of pillar between the old and new air course, if you have not started at this I would advise you to do so at once. I found on this visit the mine-foreman did not go around the mine more than once a week, and therefore did not know but very little about the condition of the Mine. The mine-foreman should visit each place in the mine at least twice or three times each week. I spoke to the mine foreman in regards to this matter and his answer was that he was ordered to do other work. This is a condition that should not exist in a mine like Castle Gate, as we all know that the mine is so easy to be made dangerous with our dust so explosive and the amount of gas that is given off in the mine.

My opinion is that the mine foreman should not have his hands tied and I must insist that the mine-foreman must attend to his duty, as there is no economy in taking him from his work to do other work. I find this condition in several of our mines.

My third official visit was on July 29th. I went through the mine and found it in a fairly good condition with the exception of the 7 off 13 raise, here I found the ventilation was bad, the atmosphere was thick and badly mixed up and in my opinion not safe to work in, as the blaze on each lamp acted as if it was hung on a rubber band.

The rooms have no crosscuts in and the inside room is on the inside of the cross cut between the main and back entry. The entry was driven so narrow that there is no place for braddice without taking a skip along the entry. I spoke to all the fire bosses and asked them, why it was that their work on ventilation had gone so far behind. Their answer was that they were taken off to do other work, this is a condition similar to the one I spoke of in regards to the mine-foreman, in my last report to the superintendent. I find that the fire-bosses have been working almost day and night at other work in place of keeping the ventilation up. I must say that a fire boss should not be overworked, especially in a mine like Castle Gate, where there is so much work to go through.



Castle Gate Coke Ovens.



Company House at Castle Gate.



When you start to hurry your firemen and overrun them with work, there is where you make a mistake. If the fire boss makes a mistake or neglects his duty we are gone, so I must insist that the fireboss tend to their own work, keep up the ventilation, as they are not supposed to lay track, timber, etc., there is plenty of work for them to see to the safety of miners and property.

I wired the Mine Superintendant at 5:45 a. m., July 31, as follows: Take all the men out of 7 off 13 raise except those you need to widen the entry, put up canvas, as the air you have now is so mixed and unsafe.

I still insist that no men shall work there until there is sufficient air to render harmless the noxious gases, except those necessary to make the improvement.

As I went on through the mine, I found all the employees using inferior oil which I will say is nearly one third coal oil.

I will call your attention to section 13 of the Coal Mining Laws of the State of Utah for 1905 which reads as follow:—Only a pure oil, or oils as shall be free from smoke as pure animal oil or pure cotton seed oil, shall be used for illuminating purposes in any coal or hydro carbon mine.

I found all the rooms that were a little ahead of the air were full of the worst kind of smoke and a man could hardly breathe.

On my last two visits I spoke to the bosses also to the men and warned them of the penalties for using such oils, but no one seems to pay any attention. I will therefore give you 15 days to clean out this oil and get oil that is fit to use; if the change will not be made by the end of 15 days, I will proceed according to law. Hoping you will see to this at once to save further trouble.

My next visit was on August 3rd. I went through the mine and found it in a better condition than on my last visit. The ventilation had been improved and the bad oil replaced by good oil.

I made other visits and found the mine in about the same condition as the above visit.

COPY.

CASTLE GATE, UTAH, April 13th, 1905.

*Mr. Gomer Thomas,*  
*State Mine Inspector,*  
*Salt Lake City, Utah.*

DEAR SIR:—Enclosed herewith please find a letter to me from Mr. Howard, our superintendent at Sunnyside regarding a plan which he has presented for reducing our ventilating expenses at Sunnyside.

We have recently made a connection between No. 1 Mine and No. 2 Mine to be used as an escape-way as is shown on the accompanying sketch.

As you doubtless remember our No. 2 Mine is ventilated by a fan run by its own engines and boilers near the entrance to this mine. This requires considerable coal and the constant attendance of two men, and had quite an expense for repairs to the boiles.

What Mr. Howard proposed to do is to draw the air from No. 2 Mine through this escape-way into No. 1 and carry it through the workings on the 1st Right Entry off the slope in No. 1 Mine and along the air course to this entry to No. 1 fan; or in other words to ventilate No. 2 Mine by the No. 1 fan using this escape-way as the return from No. 2 Mine.

I presume we may be infringing upon the law slightly in having more than the stipulated number of men on a single split; but as you are well aware No. 2 Mine never makes any gas, and from actual experience, Mr. Howard having made a test of this matter in the last two or three days, the return air in No. 2 Mine is remarkably pure and there is no question in our minds but that no harmful results can come from our putting into effect this system of ventilation.

Mr. Howard's letter explains the volumn of air we expect to use in No. 2 Mine and in this 1st Right off the slope of No. 1 Mine showing that so far as the ratio between the volumn of air and the men and animals working we are clearly within the law. As you know our No. 1 fan at Sunnyside is a large one and



Sunnyside Crusher Plant and Bridge.

certainly has a capacity to furnish all the air needed for those two mines.

This plan will effect quite a saving in our operation, and it seems to me that as far as the safety and health of our men is concerned there are no objections whatever to it.

Will you kindly give this matter your consideration and let me know if you think it will be all right for us to go ahead and carry out this plan.

Very truly yours,

S. KEDZIE SMITH,  
Gen. Supt.

SALT LAKE CITY, UTAH, May 2nd, 1905.

*Mr. S. Kedzie Smith,  
Gen. Supt. Utah Fuel Company,  
Castle Gate, Utah.*

DEAR SIR:—In answer to yours of April 13th, 1905 in regards to ventilating No. 2 Mine by means of No. 1 fan at Sunnyside. Will say that I don't see my way clear to make such a change.

I must call your attention to section 9 of the Coal Mining Laws which were approved March 17th, 1905, which reads as follows:—Every mine wherein are employed more than seventy five persons, must be divided into two or more districts. Each district shall be provided with a separate split of pure air, and the ventilation shall be so arranged that not more than seventy five persons shall be employed at the same time in any one current or split of air.

By making this change you would have 174 men working in the same split which would be contrary to the Law.

I would suggest that you would take fresh air through No. 2 main entry from Water Canyon, to ventilate the first raise entry and all the raises and return it to No. 1 fan. And ventilate No. 2 independently.

In order to cut down expenses in No. 2 you can take one shift off the fan, run it one hour after the

shots are fired—you can also reduce the speed of the fan and do with one half the steam that you use, as there is far more air going in No. 2 than the law requires. By doing this it will take less water to keep the mine damp as the more air we have the more water we need. By making this change you would save the salary of one man, the use of one of the boilers and from 40 to 45 tons of coal a month, this itself would be quite a saving and we would still be on the safe side of the law.

Hoping the above will meet with satisfaction, I remain.

Very truly yours,

GOMER THOMAS,  
State Coal Mine Inspector.

SALT LAKE CITY, UTAH, July 21st, 1905.

*Mr. W. J. Elwood,*  
*Mine Supt.,*  
*Castle Gate, Utah.*

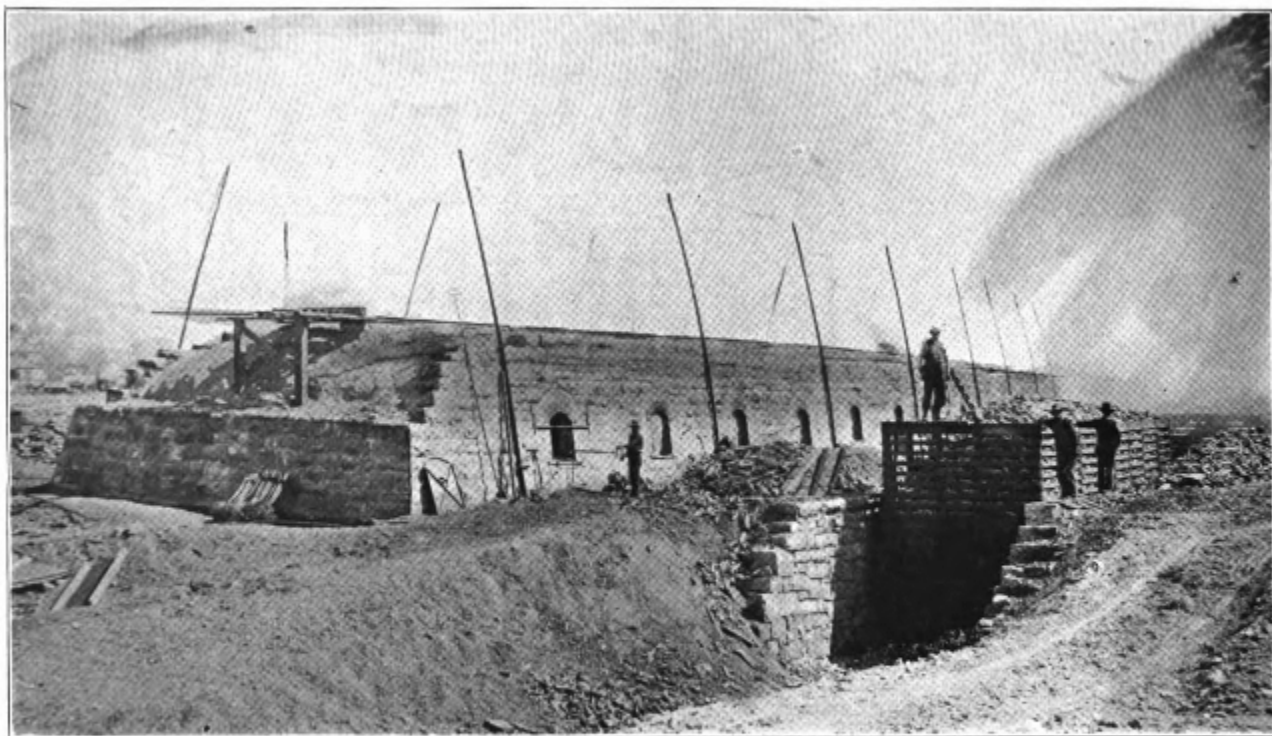
DEAR SIR:—In answer to yours of July 27th in regards to a temporary certificate to James Larkin. I must say that I know but very little about him and it is our duty to get the very best of men to act as Fire-bosses, and as you are aware that the Castle Gate is a large mine and there is a large field worked out with many a big goffs and in most places they give off more or less gas, so you see we must not employ strangers to do this kind of work. I would much rather keep the old hands if possible.

The rumor that is going around about our old firemen I am afraid has a good bit of a grudge hanging to it, as I inquired in regards to this matter and could not find any thing that would condemn them.

I will call a meeting of the Board in a couple of weeks and we will take up the Fire Boss examination at the same time.

Yours truly

GOMER THOMAS,  
State Coal Mine Inspector.



South End Sunnyside Coke Ovens.

SALT LAKE CITY, UTAH,  
August 15th, 1905.

*Mr. W. J. Elwood,*  
*Supt. Castle Gate Mine,*  
*Castle Gate, Utah.*

DEAR SIR:—I wish to call your attention to Sec. 13 Coal Mining Laws of Utah for 1905, and also to my telegram of July 31st, where I notified you to stop working in room and entries on 7 off 13, until you had put more fresh air in there.

On my visit to the Castle Gate on August 10th I found that you did not stop the men from working while you were putting up the canvas and taking in air. I demand an explanation as you have violated the laws of the State, by letting the men work contrary to my orders. I will furthermore call your attention to Sec. 18 of the Mining Laws, which reads as follows:—The neglect or refusal to perform the duties required to be performed by any section of this act, or the violation of any of the provisions hereof, shall be deemed a misdemeanor, and any person so neglecting or refusing to perform such duty or violating such provisions, shall, upon conviction, be punished by a fine of not less than one hundred dollars, nor more than five hundred dollars for each and every offense.

Respectfully yours,

GOMER THOMAS,  
State Coal Mine Inspector.

COPY.

CASTLE GATE, UTAH,  
August 17, 1905.

*Mr. Gomer Thomas, State Coal Mine Inspector,*  
*Salt Lake City, Utah:*

DEAR SIR:—Your favor of August 15th to Superintendent Elwood, Castle Gate, was referred to me. Mr. Elwood says that it would have quite seriously interfered with our output to have closed that entry off

entirely and, as they were getting on the entry at that time, about 400 feet of air per man after allowing 300 feet for the single mule working there. He thought it would be sufficient if he took the men out of the one room inside the last cross-cut and proceed to put the brattice in the entry as you instructed, immediately. The morning after receiving your telegram they took the men out of the room inside the cross-cut and began immediately to put up the brattice. This was the only day the mine worked after receiving your telegram and until the brattice was all put up according to your instructions; the next day was an idle day; and before the next working day began, the brattice was all up.

We have no desire, whatever, to disobey any instructions you may give, and are glad to co-operate in making our mines as safe as possible, but there was no time to discuss the matter with you, and Mr. Elwood though there was no explosive gas present, there would be no harm in doing as he did.

I will be very much obliged if hereafter you will take these things up directly with me instead of with the mine superintendents, as we can bring about the desired changes quicker and with much less discussion than if they are taken up with the mine superintendents.

Yours truly,

S. KEDZIE SMITH,  
General Superintendent.

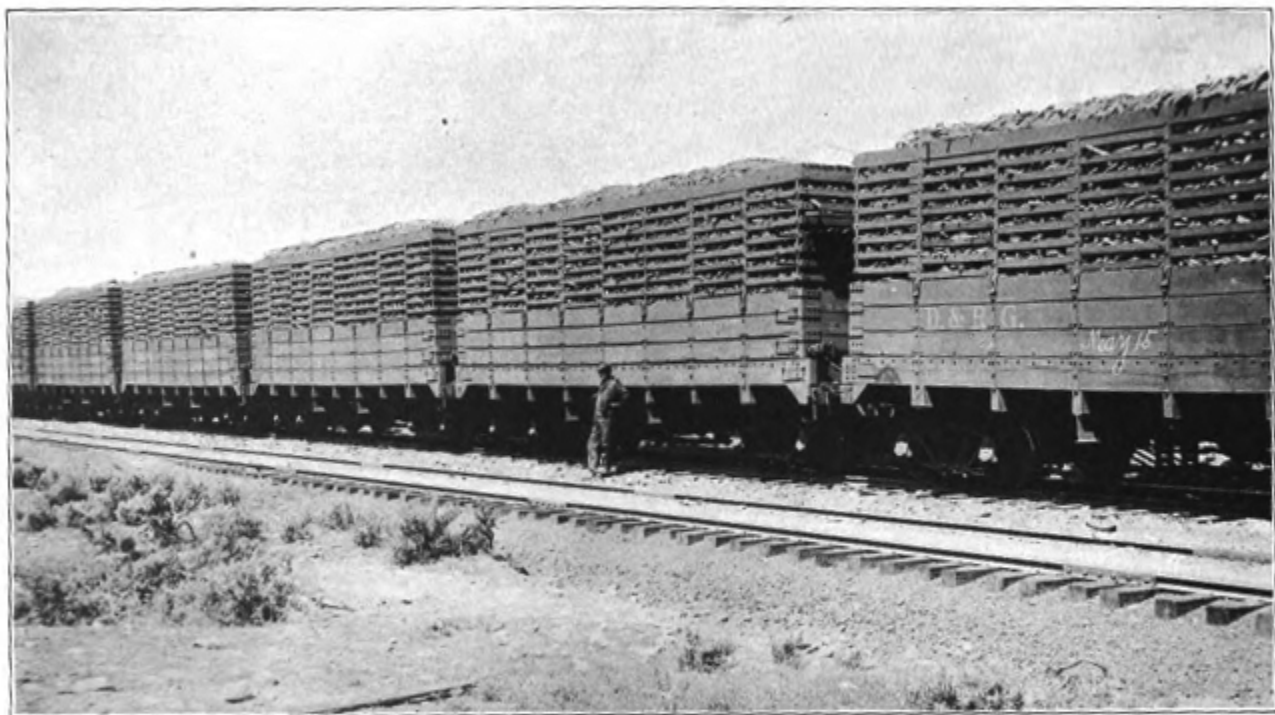
#### SUNNYSIDE MINES NOS. 1 AND 2.

These mines are owned and operated by the Utah Fuel Company, and are situated seventeen miles east of Mound S, on a branch of the Rio Grande Western.

No. 1 mine is worked by a slope. Haulage is done by steam and horses. The power used in taking the water out is compressed air, artificial ventilation, by fan.

No. 2 mine is a drift. Haulage is done by an electric locomotive and electric hoist. The mine is ventilated by artificial ventilation, by fan.

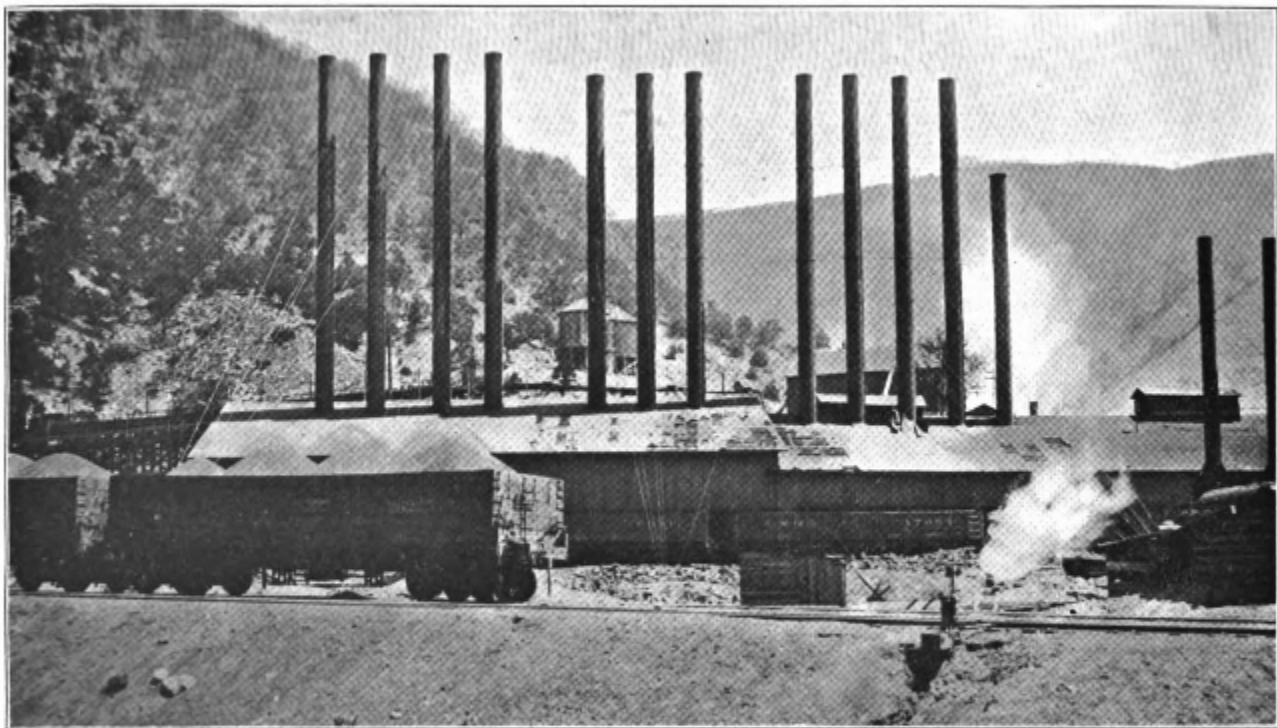




Coke Cars as they are Loaded.



Sumyside Mines 3 and 5.



Sunnyside Power House.

The output of Sunnyside mines Nos. 1 and 2 for the year 1905 is as follows: 639,934 short tons; average number of days worked, 271; men employed, 648; average price per ton on cars at mines, \$1.18; coke produced, 132,364 short tons.

My first official visit to these mines was on February 19-20, 1905. I went through No. 1 mine and found everything in a good condition.

I could not go through No. 2 mine as it was idle and the fan shut down.

My next official visit was on May 16 and 17, 1905. I went through No. 1 mine and found it in a fairly good condition with the exception of the first right, here I found the ventilation to be in a very bad condition, with the stoppings leaking throughout the district. The air was so bad that I found some of the men were staggering from one side of the entry to the other, all on account of not having enough air. This is a condition that should not exist in mines that do not do any shooting during working hours. All this came about through the mine foreman not having time to see to it, as it is here like in the rest of the mines, the mine foreman's attentions are called to getting out cheap coal in place of attending to his duties and seeing that the mine is kept safe and healthy.

I am sorry to say that our mine foremen are overworked and their wages are too small, as it is impossible to get work out of men that are not paid the proper wages.

To change the above condition in regards to the air in the first right, I suggested to the mine superintendent and mine foreman to go into No. 2 and bring a part of the air from No. 2 down through the first right. My instructions were followed out and proved to be a success, as the air was greatly improved by noon the next day.

I went through No. 2 and Water Canyon and found the mine in good condition, well timbered and watered with good ventilation.

My next official visit was on August 4 and 5, 1905. I went through No. 1 mine and found all the men working in the Water Canyon vein, working with safety lamps. I found a few small feeders of gas in the en-

tries, but not enough to interfere with the safety of the mine.

The mine superintendent and mine foreman went with me on this trip, and as we went through the mine the superintendent and mine foreman found fault with my last report, on account of me reporting the mine not properly ventilated. I reported the mine just as I found it, as it was not properly ventilated.

Thomas Bell, the mine foreman, during the day disputed my word, also my last report, and he got so angry that I had to insist upon the superintendent not to let him come with me any more, as he was interfering with my work.

I went through other parts of the mine, and found it in a fairly good condition, with the exception of a few places being dry and dusty. The superintendent was with me and he informed me that he would see to it at once. The slope that was dry on my last visit had been watered and kept damp.

I found No. 2 mine in a good condition, well watered, timbered and ventilation good.

I visited the mines on August 29 and 30, 1905, and found the improvements that I had suggested on my previous visit had been complied with, and the mines were in a fairly good condition.

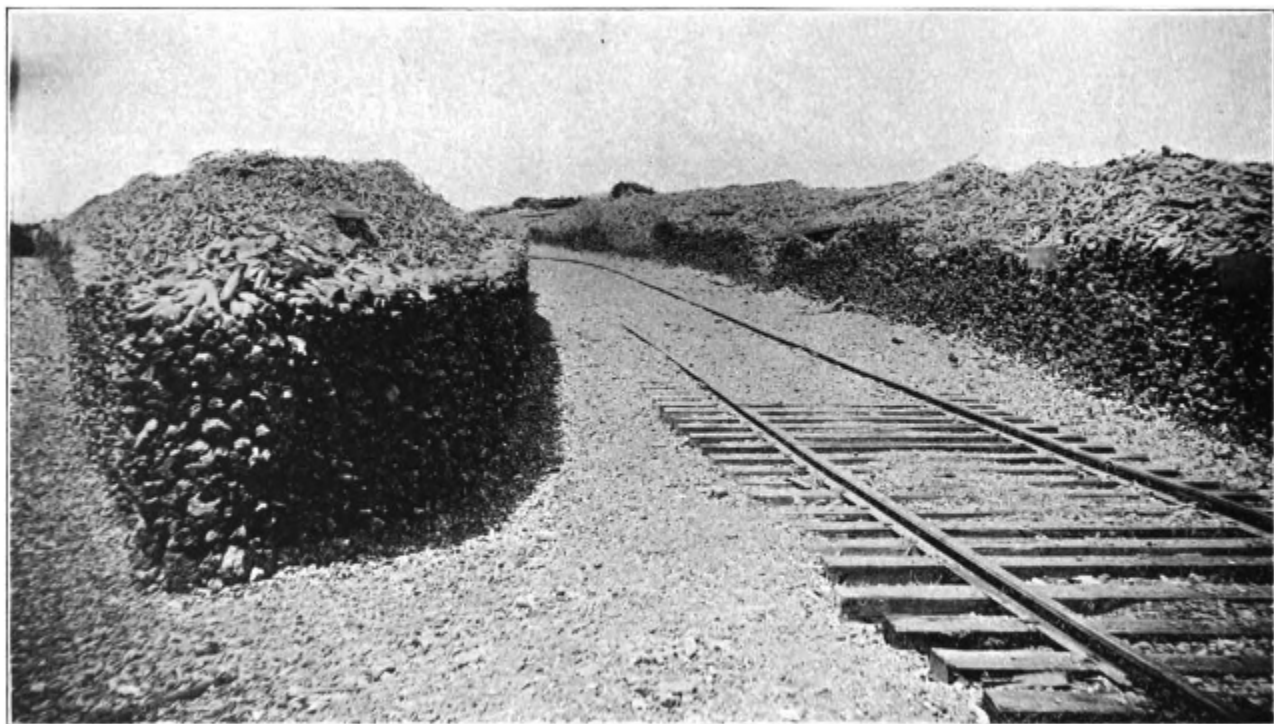
My next visit was on November 23 and 24, 1905. I found the mines in a good condition.

I made another visit and found the mine in good condition.

#### GRASS CREEK MINE.

This mine is owned and operated by the Grass Creek Coal Company, of Salt Lake City, and is situated eight miles north of Coalville, on the Echo and Park City branch of the Union Pacific.

The mine is worked by a drift, and is ventilated by artificial ventilation. The mine produced 40,561 short tons of coal during 1905, consumed 15,350 pounds of black powder, working 255 full days, employing 52 men and 10 horses. There was one fatal and one non-fatal accident. Number of steam boilers, three.



Reserve Coke at Sunnyside.

The following are the officers of the Grass Creek Coal Company:

Joseph F. Smith, president.  
 W. W. Cluff, vice-president.  
 Arthur Winters, secretary and treasurer.  
 John Pettit, mine superintendent.

I made seven visits to this mine during the year 1905, and always found the mine to be in a very good condition.

#### WASATCH MINE.

This mine is owned and operated by the Weber Coal Company of Salt Lake City, and is situated about three miles east of Coalville, on the Echo and Park City branch of the Union Pacific. This mine is worked by a long slope and ventilated with a fan. During the year 1905 this mine produced 34,350 short tons of coal, working 256 full days, employing 42 men and 9 horses, four steam boilers and one large steam hoist. There was but two non-fatal accidents.

I made seven visits to this mine during the year 1905, and always found the mine to be in a very good condition.

#### THOMAS AND TUTTLE MINE.

This mine is owned by the Sterling Coal and Coke Company of Salt Lake City, and operated under a lease by Henry S. Thomas of Wales, Utah.

The mine is situated about two and one-half miles east of the town of Sterling, at the terminus of the Sanpete Valley Railroad.

The outpout of this mine during the year ending December 31, 1905, was 4,202 short tons, at a cost of \$1.45. There were 12 men employed and two horses.

I visited the mine during the year and found it in a good, safe condition, all places well timbered and kept damp. The mine is ventilated by natural ventilation.

Summary of wages paid: Mine foreman, \$3 per day; miners, per ton (2,240 pounds to the ton with

one-fourth off for slack) \$1; miners working by the day, \$3.50; timber men per day, \$2.50; drivers per day, \$2.50; outside laborers per day, \$1.50.

#### ABERDEEN MINE.

The Aberdeen mine is owned and operated by the Whittemore and Ballinger company of Price, Utah, and is situated about eight miles northeast of Price.

During the year 1905 this mine produced 500 short tons, employed two men and four horses, average days worked 75, consuming 325 pounds of powder. This coal is hauled to the town of Price, on the Rio Grande Western Railroad, and sold at \$3 per ton for domestic use.

#### HUNTINGTON MINES.

These mines are located, one in Deer Creek, which employs four men. The coal mined is sold in the valley to the farmers. One in Bear Canyon, which employs ten men, under the instructions of Mr. D. C. Robbins as agent.

There are several other openings in the canyon, all being worked under the same management.

#### CEDAR CREEK MINE.

This mine is located 12 miles south of Huntington, and is operated by the Cedar Creek Coal Company. Mine superintendent, William Howard.

#### IRON COUNTY MINES.

There are two mines located on Coal Creek, some 10 miles east of Cedar City, employing four men during the winter season, selling their coal to Cedar City. The coal is of good quality for steam and domestic purposes.

The Corey Brothers' mine is located some five miles southeast from Cedar City, employing two men during the winter season.



Kanarra mines are located some five miles north-east of Kanarra, about 30 miles north of St. George and 40 miles from Lund, employing five men supplying coal to the valley.

Uintah County has some 34 openings on a five-foot vein, five to eight miles north of Vernal, the coal is of a fair quality for domestic purposes. There are other large coal fields in Uintah County that have not been touched.

#### NEW HARMONY COAL COMPANY'S MINES.

These mines are situated five miles north-west of New Harmony, on the east side of the Granite Mountain, on the line of Iron and Washinton counties, 45 miles south of Lund, a town on the S. P. L. A. & S. L. R. R.

The company has spent \$55,000 on development work, employing five men. The coal is a semi-anthracite, but the veins are small, and mixed with slate.

Robert Addison Kirker, manager and co-owner.

#### OZOKERITE, ASPHALTUM, GILSONITE AND ELERITE.

The following are the companies that are working Gilsonite mines:

American Asphaltum & Rubber Company, Pariette, Utah.

St. Louis Gilsonite & Asphaltum Company, Fort Duchesne and Dragon.

Raven Company, working elerite on Indian Creek and asphaltum, some five miles north of Fort Duchesne.

#### AMERICAN OZOKERITE COMPANY.

Which is located at Soldier's Summit and Colton, Utah.

#### PLEASANT VALLEY OZOKERITE MINING COMPANY.

Which is located at Colton, Utah.

## COLTON WAX MINE.

Which is located at Colton, Utah.

The above mines have done but very little work during the year 1905, on account of no market for the product.

## ASPHALTUM MINES.

Salt Lake City owns one of these mines, which is situated near Thistle Junction, on the Rio Grande Western.

Sunnyside Asphaltum Company, which is situated twelve miles northeast of Sunnyside.

Vernal Asphaltum Company, situated eight miles north of Vernal, Utah.

There are other large deposits of asphaltum in Utah which have not been prospected.

## UTAH HYDRO-CARBON FIELDS.

The hydro-carbon fields of the Uintah basin contain one of the greatest of Utah's resources—pure gilsonite. The supply, to all appearances, is inexhaustible; it is sufficient to supply the whole world for an unlimited number of years.

The gilsonite fields begin at a point about three miles west of the west line of the old Uncompahgre Indian reservation, and extend easterly over what was the reservation for a distance of seventy-five miles, clear across the Colorado boundary. In area they are about seventy-five miles long east and west, and about forty miles wide, north and south.

The gilsonite fields, or at least nearly all the valuable gilsonite claims, are owned by the "asphaltum trust." The St. Louis Gilsonite Company and the Gilson Asphaltum Company, both of which are subsidiary corporations of the "asphaltum trust," are operating in Utah, and one of their main objects, up to date, has been to limit the supply of gilsonite and asphaltum so as not to over-supply the market and thus force down the price.

## USES OF GILSONITE.

Gilsonite is utilized mainly in the manufacture of varnishes, pipe-dip, roofing materials, etc. It can also be utilized in the manufacture of rubber goods. Ordinary rubber goods, it is maintained, can contain about 40 per cent of gilsonite. Much Utah gilsonite has been marketed in Europe.

The Utah gilsonite is pure when mined. It requires no treatment after being taken from the vein before it is used for manufacturing purposes. The aim of those who control the product is therefore to supply only what the market requires and no more. No where else in the world is it found in pure form. It is a soluble bitumin dissolving readily in benzine.

The supply of the adjacent asphaltum is held down by the trust, because in the eastern oil fields asphaltum is manufactured as a by-product and can be purchased much cheaper than the Utah product can be shipped east to the great markets. This supply of eastern asphalt is almost unlimited, too, and until a large market can be created in the west, the trust will naturally limit the local output.

## PERFECT FISSURE VEINS.

The gilsonite in the Uintah basin runs in the most perfect fissure veins known to the mining world. The four large veins are the Little Bonanza, the Cowboy, the Big Bonanza, and the Black Dragon. The St. Louis Gilsonite Company already referred to, is working the Black Dragon vein at Dragon, the present terminus of the Uintah railway.

The gilsonite lies in perpendicular veins between solid walls of rock. At one point where the vein is exposed, in White River cut, it is seen to be 3,000 feet deep. This particular vein averages twelve feet in length, and is so perfectly formed that it is possible to drive a buckboard along the top of it. It is the belief of experts that all the big veins are from 3,000 to 80,000 feet deep. They are perfectly visible to the naked eye.

There are thirty-eight varieties of hydro-carbon products to be found in the Uintah basin and adjacent territory, ranging all the way from pure gilsonite to varieties that are valueless for any purpose whatever, but which have the appearance in large measure of the more valuable hydro-carbon products.

#### OTHER ASPHALT FIELDS.

Sand, asphaltum, bituminous limestone and other hydro-carbon products are to be found in great quantities in Spanish Fork Canyon, in Utah County, in Tie Fork, Indian Fork and other adjacent localities. The city of Salt Lake owns a group of asphalt claims near Thistle, in the same vicinity, and the product of this group has been used in paving several Salt Lake streets.

The St. Louis Gilsonite Company has built the Uintah railway from Mack, a station on the Rio Grande Western, across the Colorado line to Dragon, Utah, the scene of its principal operations at present. As the necessity for extending the company's operations grows more imperative it is proposed to build two branches of this road from Dragon. One will run to Fort Duchesne, where the company owns other gilsonite properties, and where it used to operate, and the other to Vernal. The present length of the road from Mack to Dragon is fifty-two miles.

The principal mission of the railroad, of course, is to give the company an outlet for its product; but lines of automobile stages connect the present terminus of the road with the country beyond, and in this way the road has served purposes other than getting the gilsonite product to market.

Prior to the building of the road the gilsonite operations were principally at Fort Duchesne, and the product was taken out overland to Price, a distance of 100 miles. In all probability the railroad will ultimately be absorbed by the Rio Grande system, with which it connects.

The control of the gilsonite fields by the asphalt trust is due to congressional legislation. Many years ago individual miners located a vast number of claims, on the reservation, but it was not open, and of course

they could neither work the claims nor secure patents.

When the reservation was opened Congress specifically closed the asphalt and gilsonite fields to mineral entry. Then the trust purchased from the miners a quit-claim to their right of discovery, and secured the passage of legislation opening to entry every alternate section of the asphalt fields and validating the rights to which they had purchased quit-claims.

The Gilsonite Asphaltum Company is doing an extensive amount of work in their great gilsonite deposits, shipping a large amount daily to St. Louis. At this point the product is variously treated, the first-class grade being converted into fine varnishes, and the remainder into paving material. It is a well known fact that these gilsonite deposits are tremendously large, and more development work is now being done than ever before in the history of that region.

The veins of gilsonite extend for miles across the country, and the company is not bothering with these veins unless they are from 10 to 20 feet wide. Work is being done entirely with pick and shovel, as the explosive qualities of the dust prohibits any attempts at blasting. While it can be said that no more modern manner of mining this deposit is known, the method is considered satisfactory as the walls are as perfect as the walls of a building.

Mr. R. M. Pope & Co. have 100 claims of valuable ground on the reservation. Of these 37 are gilsonite, the remainder being elerite. Mr. Pope expects to be a heavy shipper of hydro-carbon during 1906.

# REPORT FOR 1906.

REPORT OF  
State Coal Mine Inspector  
FOR 1906.

*To His Excellency, John C. Cutler,  
Governor of State of Utah.*

DEAR SIR:—I have the honor to submit herewith my report as State Coal Mine Inspector for the year ending November 30th, 1906.

Respectfully your,  
GOMER THOMAS,  
Stake Coal Inspector,

INTRODUCTION.

The year 1906 was a most extraordinary one in the industrial life of the United States, in all branches of trade, there was felt the quickening impulse of prosperity and the great coal producing states of the West were alive with an activity never before equalled as a result, the output that has been growing year by year, the significance of this tremendous tonnage as a means of augmenting the wealth of this country, and as a source of comfort to all classes of people can scarcely be appreciated, persons ordinarily have but little conception of the value of coal, either as a domestic commodity or as a factor in the development and maintenance of our great industrial interest.

Bituminous coal is the great power that lies at the foundation of all our manufacturing interest, it enables the factory, the furnace, the locomotive, and the steam boat to create and transport the vast and constantly growing wealth of the land. It is little wonder then, that the mere suggestion of a coal famine in

Utah is enough to cause alarm and anxiety among the manufacturing and transportation interests, as well as among the vast army of householders. The financial welfare of the former and the physical comfort of the latter are dependent largely upon coal, and naturally the advent of any element that threatens the disorganization of the trade or interruption of production is viewed with feelings of trepidation.

Utah has had a small coal famine, which has caused a delay in our metal mines, furnace and smelters, and a great many of our householders have had to suffer. There are a few reasons why we suffered a coal shortage. First, is that this country has outgrown to a tremendous extent its facilities for supplying its demands, the extensive construction and other industrial projects have so drawn on the available supply of labors that as the demand for coal has increased the supply of miners and surface laborers has decreased, in our various mines. Our mines are producing all the coal that our miners can dig and is shipped direct to the market, our mines are producing something like 200 cars per day at present. Second, there has been a great increase in the newly opened metal mining fields of the West and Southwest, which has increased the demand for our coal over 400 per cent. Near home we have the plants at Garfield which has increased the demand for smelter coal and coke over 100 per cent. To meet these increased demands our mines have increased their output over last year's production from 30 to 35 per cent. We have suffered greatly from the lack of railroad cars and power to haul the coal to market.

In my report of 1905 I suggested to the honorable Legislature of Utah which meets in Jan. 1907, that they make an amendment to the coal and hydro-carbon mining laws of the State of Utah, as follows: That it shall be unlawful for any miner or any employee in the coal or hydro-carbon mines of the State to use or set off any high explosives for the mining of coal or taking down rock during the working hours, as all shots must be fired after the men are all out of the mine excepting those that will be needed to fire the same.

My reasons for the above suggestions are, that the men employed in the mines are allowed to use ex-



plosives, which causes the air in the mines to become vitiated by the unnecessary use of powder for blasting of the coal, as in some of our large mines they are shooting and using powder throughout the day.

Other reasons are that the great source of danger comes from the use of powder, such as blow out shots, etc., as nearly all our explosions occur through this source, especially where a mine is dry and dusty. Hoping the honorable body will take this matter up as it is one of the most needed amendments of today.

#### SOURCE OF TROUBLE IN UTAH.

Provisions of the mining law that exempts from inspection the mines employing six men or less. There are scores of such mines in this State, and while the inspector visits them occasionally, he has no authority to take any action regarding their condition, these mines have no fans or furnaces and in other respects they are operated without regard to law. We have no means of ascertaining how many men are killed in them or what amount of coal they produce, but from the occasional visit made to them by the inspector, we have reason to believe that most of them should be closed, as they are unfit for men to work in. All mines should come under the provision of the mining laws, at least so far as ventilation and the safety of the workmen are concerned.

Electric haulage has been introduced in several of the large mines of our State and prove an ideal power for hauling the heavy tonnage of coal through the extensive underground levels and tunnels. Electric motors using a direct current of 500 volts, being employed in this work, this voltage is supposed to be harmless, but results prove otherwise. There is not a word in the mining laws of this State governing the operations of mines that has the least application to the dangers of electric wire, mining machines or hauling motors, in fact the word electricity, or mining machines, are not to be found in the mining laws which no doubt is attributable to the fact that at the time the present mining laws were enacted, electricity in our mines was practically an unknown experiment, now the greater percentage of our coal is produced from its use, and

the amount of machinery introduced in the mines is rapidly on the increase yearly.

A metalliferous mining law should also be enacted to cover all mining operations, quarries, iron and clay mines in the State, especially there is a great suffering in our metal mines from lack of ventilation and from the reports received through the papers the death rate among the employees is proportionately higher than the coal mines.

The mining law is enacted to safe guard the health and life of the employees and to preserve the property of the operators, whatever tends to protect the life and preserve the health of the coal miners would fulfill the same purpose with the metal miners. It is not the duty of the Mine Inspector to draw up a code of mining laws, unless instructed to do so by the Governor, but I assume it to be my duty to call to this important matter the attention of the Governor, the Senators and the Representatives of the people, especially those representing mining communities.

The condition of the mines of the State of Utah will compare favorably with any State in the Union, notwithstanding the industry is in its infancy. Having been in a position to know the condition of the coal mines in the State for the past ten years, the inspector feels safe in saying that at no previous time have the general conditions been as good as they are now, with respects to ventilation, drainage and general safety.

I am sorry to say that conditions in our Hydro-Carbon Mines are not as favorable as they are in our coal mines, on account of the dust being of a very explosive nature. As the inspector is in doubt as to whether it is safe to use electric light in preference to a safety lamp.

We had an explosion in one of those mines which caused the death of four men, on the 28th day of April, 1906. This mine has been closed down since the explosion occurred, on account of the inspector and the operators having not decided on a safe mode of working. The opinion of the inspector is that they will have to be worked with a safety lamp.

The jurisdiction of the State Coal Mine Inspector under the existing laws extends only to the mere start of the Hydro-Carbon Mining Industry. A great deal of

thought has been given to the enactment of legislation that would tend to safe guard the Hydro-Carbon Miner in his hazardous work, and at the same time treat with justness the rights and the interest of the operator. The Hydro-Carbon Mining Industry of Utah is so vast that it has over shadowed a great many other kindred industries and the result has been that the Hydro-Carbon Mines have been allowed to develop with complete freedom from legal restraint or guidance. These interests are now great enough to demand attention. They have reached a stage of development where they should be brought within the purview of the law. The operators of these industries should be complete to take all the necessary precautions to protect their employees, and the employees in turn should be brought under such statutory regulations as will insure careful attention to the rules necessary for the protection of life and property. It is the judgment of the inspector that the next legislature should be made familiar with the need of these industries for proper regulation in their development and operation and to that end a bill should be prepared and introduced at the session of 1907.

There should also be something done in regards to giving the inspector power to appoint a deputy to inspect the Hydro-Carbon Mines, at a salary of \$5.00 per day and expenses, and an appropriation made to cover the same, as the mines are so scattered over the southeastern part of the State, over 100 miles from the railroad, as it is impossible for the inspector to cover the ground and do the work as it should be done.

There is no other subject so worthy the attention of the legislature in their duty of framing and placing on the Statute Books proper legislation for the protection of life and property that that which the mining industry of to-day requires if we would place ourselves in the spirit of development and progress which the intelligence and humanity of this 20th century demands.

The production of coal in 1906 was 1,839,219 short tons, showing an increase of 236,691 short tons over the preceding year.

The amount of coke was 282,195 short tons, an increase of 66,483 short tons over the previous year.

There was also produced in the State 11,531 short tons of Gilsonite, the value of which would be \$403,585.

The amount of Asphaltum I am unable to state as I could not obtain the proper data.

The number of employees in and around the coal mines of the State was 1,895 and the average number of days worked was 296 days.

The amount of high explosive used was black powder 176,414 pounds and dynamite 95,015 pounds.

Average amount of coal produced per man in and around the coal mines, coke oven men not included, was 1,107 short tons, number of fatal accidents for every one thousand men employed was two, number of tons for every life lost was 613,073 short tons.

There were 28 accidents in the Utah Coal and Hydro-Carbon Mines in 1906, of which 7 resulted fatally, two wives made widows and five children were left fatherless, three were killed in the Coal Mines and four in the Hydro-Carbon Mines.

I cordially commend the manner, not only with which the operators have furnished me with an account of their production, but with which they have otherwise assisted me in my labors, and complied with all suggestions, which the duties of my position required me to make to them.

TABLE SHOWING THE COAL PRODUCTION IN THE STATE  
OF UTAH FROM 1876 TO 1906, INCLUSIVE.

YEAR	NO. TONS PRODUCED	GAIN	LOSS
1876.....	50,400	.....	.....
1877.....	50,400	.....	.....
1878.....	67,200	16,800	.....
1879.....	225,000	157,800	.....
1880.....	225,800	.....	.....
1881.....	250,000	25,000	.....
1882.....	250,000	.....	.....
1883.....	250,000	.....	.....
1884.....	250,000	.....	.....
1885.....	213,120	.....	36,880
1886.....	200,000	.....	13,120
1887.....	180,020	.....	19,980
1888.....	259,501	79,500	.....
1889.....	236,651	.....	22,850
1890.....	318,159	81,508	.....
1891.....	371,045	52,886	.....
1892.....	361,314	.....	9,731
1893.....	418,049	56,735	.....
1894.....	447,276	59,227	.....
1895.....	172,958	.....	274,328
1896.....	503,243	330,285	.....
1897.....	582,092	78,849	.....
1898.....	673,297	91,205	.....
1899.....	878,122	204,826	.....
1900.....	1,233,978	456,856	.....
1901.....	1,382,470	148,492	.....
1902.....	1,641,436	258,966	.....
1903.....	1,782,178	120,742	.....
1904.....	1,563,274	.....	198,904
1905.....	1,602,528	39,350	.....
1906.....	1,839,219	236,691	.....

TABLE SHOWING THE AMOUNT OF COAL SOLD IN SALT LAKE DURING 1906, COMPARED WITH 1904 AND 1905.

	Short Tons.
1904.....	214,369
1905.....	214,995
1906.....	264,533
Total.....	693,897

PRODUCTION OF COAL, COKE AND ASPHALTUM. IMPORTS, EXPORTS AND CONSUMPTION IN UTAH DURING 1906.

Production,.....	Bituminous, 1,839,219	Coke, 282,195	Gilsonite, 11,531
Imported, .....	" 412,647	" .....	" .....
Total, .....	" 2,251,866	" .....	" .....
Exported, .....	" 67,318	" 115,699	" .....
Consumed in Utah "	2,069,148	" 166,496	" .....

TOTAL PRODUCTION OF COAL IN UTAH DURING THE YEAR 1906, BY COUNTIES.

Carbon.....	1,683,968
Summit.....	63,156
Sanpete.....	5,910
Emery.....	935
Other Small Mines.....	85,250
Total.....	1,839,219

TABLE SHOWING NUMBER OF TONS PRODUCED, NUMBER OF DAYS WORKED, NUMBER OF MEN EMPLOYED, NUMBER OF PERSONS KILLED AND INJURED, AND NUMBER OF POUNDS OF POWDER USED, ETC.

NAME OF MINE	Counties	Short Tons of Coal	Tons of Coke	Days Worked	Men Employed	Fatal Accidents	Non-fatal Accidents	Pounds of Powder	Pounds of Dynamite	Mules and Horses	Steam Boilers	Locomotives	Coke Ovens
Winter Quarters .....	Carbon .....	373,978		295	275		2	81,862	40	37	9	1	
Castle Gate .....	Carbon .....	331,405	89,072	302	385	2			56,250	40	7		204
Sunnyside .....	Carbon .....	627,876	193,123	295	680	1	14		38,650	35	16	2	480
Clear Creek .....	Carbon .....	349,432		294	249		1	74,641		40	9		
Grass Creek .....	Summit.....	28,564		268	45			3,600		6	3		
Wasatch .....	Summit.....	34,592		259	46		1	3,325	75	9	4		
Thomas .....	Sanpete.....	5,125		270	15			650			2		
Wales .....	Sanpete.....	785		95	2						1		
Huntington .....	Emery.....	500		77	2			1,500			2		
Deseret .....	Carbon .....	525		85	2			375			1		
Cedar Creek .....	Emery.....	435		75	2			1,200			2		
Aberdeen .....	Carbon .....	750		95	4			340			4		
Other Small Mines .....		85,250		215	178			6,021			20		
Gilsonite Mine .....					200	4							
<b>Total .....</b>		<b>1,839,219</b>	<b>282,195</b>	<b>2,651</b>	<b>3,094</b>	<b>7</b>	<b>21</b>	<b>176,414</b>	<b>95,015</b>	<b>199</b>	<b>48</b>	<b>3</b>	<b>680</b>

TABLE SHOWING TONNAGE BY COUNTIES FOR 1906 COMPARED WITH 1905.

Counties.	Tons for 1906	Tons for 1905	Gain	Loss
Carbon .....	1,683,968	1,444,565	239,403	
Summit.....	63,156	74,911		11,755
Sanpete .....	5,910	4,202	1,708	
Emery.....	935	3,500		2,565
Other Small Mines.....	85,250	75,350	9,900	
<b>Totals .....</b>	<b>1,839,219</b>	<b>1,602,528</b>	<b>251,011</b>	<b>14,320</b>
<b>Gain, Short Tons.....</b>			<b>236,601</b>	



TABLE SHOWING PRODUCTION OF COAL IN UTAH DURING YEAR 1906, ETC.

Counties.	Total Production in Short Tons.	Total Production of Coke.	Average Per Ton.	Days Worked.	Em- ployees.
Carbon.....	1,683,968	282,195	\$1.18	1,281	1,433
Summit .....	63,156		1.17	327	91
Sanpete.....	5,910		1.45	365	18
Emery.....	935		1.00	152	4
Other Small Mines.....	85,250		1.00	215	178
<b>Totals .....</b>	<b>1,835,219</b>	<b>282,195</b>	<b>\$1.18</b>	<b>2,651</b>	<b>1,895</b>

TABLE SHOWING NUMBER OF MEN EMPLOYED IN COUNTIES IN 1906 COMPARED WITH 1905.

Counties.	1905	1906	Gain	Loss
Carbon .....	1,722	1,433		229
Summit .....	94	91		3
Sanpete .....	12	18	6	
Emery .....	10	4		6
Other Small Mines.....	125	178	15	
<b>Totals.....</b>	<b>1,963</b>	<b>1,895</b>	<b>21</b>	<b>238</b>

COAL PRODUCED IN THE SEVERAL MINES IN UTAH  
FOR 1906.

NAME OF MINE	OPERATED BY	NO. OF SHORT TONS
Winter Quarters.....	P. V. Coal Company.....	373,978.60
Clear Creek.....	P. V. Coal Company.....	349,432.30
Castle Gate.....	P. V. Coal Company.....	333,405.95
Sunnyside.....	Utah Fuel Company.....	627,876.15
Grass Creek.....	Grass Creek Coal Company..	28,564
Wasatch.....	Weber Coal Company.....	34,592
Thomas.....	Sterling Coal Company .....	5,125
Wales.....	W. P. Bavis Coal Company..	785
Huntington.....	P. V. Coal Company.....	500
Deseret.....	Kemmerer Coal Company ...	525
Cedar Creek.....	Cedar Creek Coal Company..	436
Aberdeen .....	Whittemore & Ballinger.....	750
Other Small Mines.....	.....	85,260
<b>Total.....</b>	.....	<b>1,839,219</b>

TABLE SHOWING PRODUCTION OF COAL, NUMBER OF  
POUNDS OF POWDER USED, NUMBER OF FATAL AND  
NON-FATAL ACCIDENTS, NUMBER OF DAYS  
WORKED AND NATIONALITIES OF MEN EM-  
PLOYED BY THE UTAH FUEL AND P.  
V. COAL COMPANIES.

Coal produced .....	1,682,693
Coke .....	282,195
Average days worked.....	296
Men employed . . . . .	1,598
Fatal. . . . .	3
Non-Fatal.....	20
Pounds of Powder.....	254,443

NATIONALITIES.

Americans. ....	732
German.....	34
Finn .....	82
Italian .....	226

Austrians .....	278
Swede .....	4
French .....	13
Greek .....	155
Slavs .....	10
Negroes.....	1
Spanish .....	
Mexicans .....	
Japanese..	52
Chinese .....	1

TABLE SHOWING NUMBER OF FATAL, SERIOUS AND NON-SERIOUS ACCIDENTS AND THE COUNTY IN WHICH THE SAME OCCURRED DURING 1906.

COUNTIES	Fatal	Serious	Non-Serious	Total
Carbon .....	3	7	13	23
Summit .....		1		1
Emery.....				
Wasatch .....	4			4
Sanpete .....				

TABLE SHOWING CASUALTIES OF 1906 COMPARED WITH 1905.

COUNTIES	1905			1906				
	Fatal	Non-fatal	Total	Fatal	Non-fatal	Total	Gain	Loss
Carbon .....	5	33	38	3	20	23		18
Summit .....	1	3	4		1			3
Wasatch.....	1		1	4			2	

TABLE SHOWING THE NUMBER OF MINES EMPLOYING  
THE DIFFERENT METHODS OF VENTILATING AND  
THE KIND OF OPENING.

COUNTIES	Character of Opening			Mode of Ventilation		
	Drift	Slope	Total	Fan	Furnace	Natural
Carbon.....	56	2	58	9	1	49
Summit.....	8	2	10	2	.....	8
Emery.....	34	.....	34	.....	.....	34
Sanpete....	4	2	6	.....	.....	6
Uintah.....	25	.....	25	.....	.....	25
Iron.....	15	.....	15	.....	.....	15

Name of Person	Age	Occupation	Residence	Name of Mine	Married	Single	Children	No. Persons Dependent	Date	Cause of Accident
B. J. Boarden		Miner	Winter Quarters	Parriette	Yes		5	6	April 18	Gas Explosion
W. H. Forman		Miner	Bluff, Utah	Parriette		Yes			" "	" "
Elmer Hopkins		Miner	Kanosh, Utah	Parriette		"			" "	" "
Otto Anesq		Miner	Silverton, Colo.	Parriette		"			" "	" "
M. Imanaka	29	Miner	Japan	Castle Gate		"			June 9	Fall of Rock
Antone Bende	39	Miner	Castle Gate	Castle Gate	Yes				Oct. 23	" "
Aurible Pasquale	30	Miner	Sunnyside	Sunnyside		"		1	Nov. 14	" "

The first four named were killed in the Hydro-Carbon Mines.

TABLE SHOWING COMPARATIVELY THE NUMBER OF MINES IN OPERATION AND THE NUMBER OF DAYS WORKED IN 1905 AND 1906.

COUNTIES	Number of Mines in Operation in 1905.	Number of Mines in Operation in 1906.	Gain.	Loss.	Average Number Days Worked in 1905.	Average Number Days Worked in 1906.	Gain.	Loss.
Carbon .....	58	61	3	.....	249	296	47	.....
Summit .....	5	5	.....	.....	.....	264	.....	.....
Sanpete .....	6	6	.....	.....	.....	.....	.....	.....
Uintah .....	23	31	8	.....	.....	.....	.....	.....
Emery .....	43	52	10	.....	.....	.....	.....	.....
Iron .....	15	15	.....	.....	.....	.....	.....	.....
Morgan .....	.....	3	3	.....	.....	.....	.....	.....

TABLE SHOWING NUMBER OF LARGE AND SMALL MINES IN THE STATE AND THE NUMBER OF EACH THAT WERE IN OPERATION DURING 1906.

COUNTIES.	Number of Mines which Employed More than 6 Men.	Number of Mines which Employed Less than 6 Men.	Total by Counties.	Number of Large Mines in Operation in 1906.	Number of Small Mines in Operation in 1906.	Total Number of Mines in Operation in 1906.
Carbon .....	11	50	61	11	50	61
Summit.....	3	3	6	3	3	6
Sanpete .....	1	5	6	1	5	6
Uintah.....		31	31		31	31
Emery.....		45	45		45	45
Iron.....		15	15		15	15
<b>Total.....</b>	<b>14</b>	<b>140</b>	<b>163</b>	<b>14</b>	<b>140</b>	<b>163</b>



TABLE SHOWING LOCATION, ETC., OF MINES IN UTAH.

NAME OF MINE	NAME OF OPERATOR	COUNTY	NAME OF SUPT.	P. O. ADDRESS.
Winter Quarters.....	P. V. Coal Co.....	Carbon.....	T. J. Parmley.....	Scofield.....
Clear Creek.....	P. V. Coal Co.....	Carbon.....	Thomas Bell.....	Clear Creek.....
Castle Gate.....	P. V. Coal Co.....	Carbon.....	Wm. Forrester.....	Castle Gate.....
Sunnyside.....	Utah Fuel Co.....	Carbon.....	Wm. Elwood.....	Sunnyside.....
Aberdeen.....	Whittemore Ballinger.....	Carbon.....	A. Ballinger.....	Price.....
Grass Creek.....	Grass Creek Coal Co.....	Summit.....	John E. Pettit.....	Coalville.....
Wasatch.....	Weber Coal Co.....	Summit.....	T. J. Lewis.....	Coalville.....
Huntington.....	P. V. Coal Co.....	Emery.....	W. B. Williams.....	Castle Gate.....
Deseret.....	Kemmerer Coal Co.....	Emery.....	Thos. D. Reese.....	Wales.....
Cedar Creek.....	Cedar Creek Coal Co.....	Emery.....	Wm. Howard.....	Huntington.....
Thomas.....	Sterling Coal Co.....	Sanpete.....	H. Thomas.....	Manti.....
Huntington Creek.....	Robins Coal Co.....	Emery.....	D. C. Robbins.....	Salt Lake City.....
Anthracite Coal Co.....	Anthracite Coal Co.....	Iron.....	Robert Kirker.....	Cedar City.....

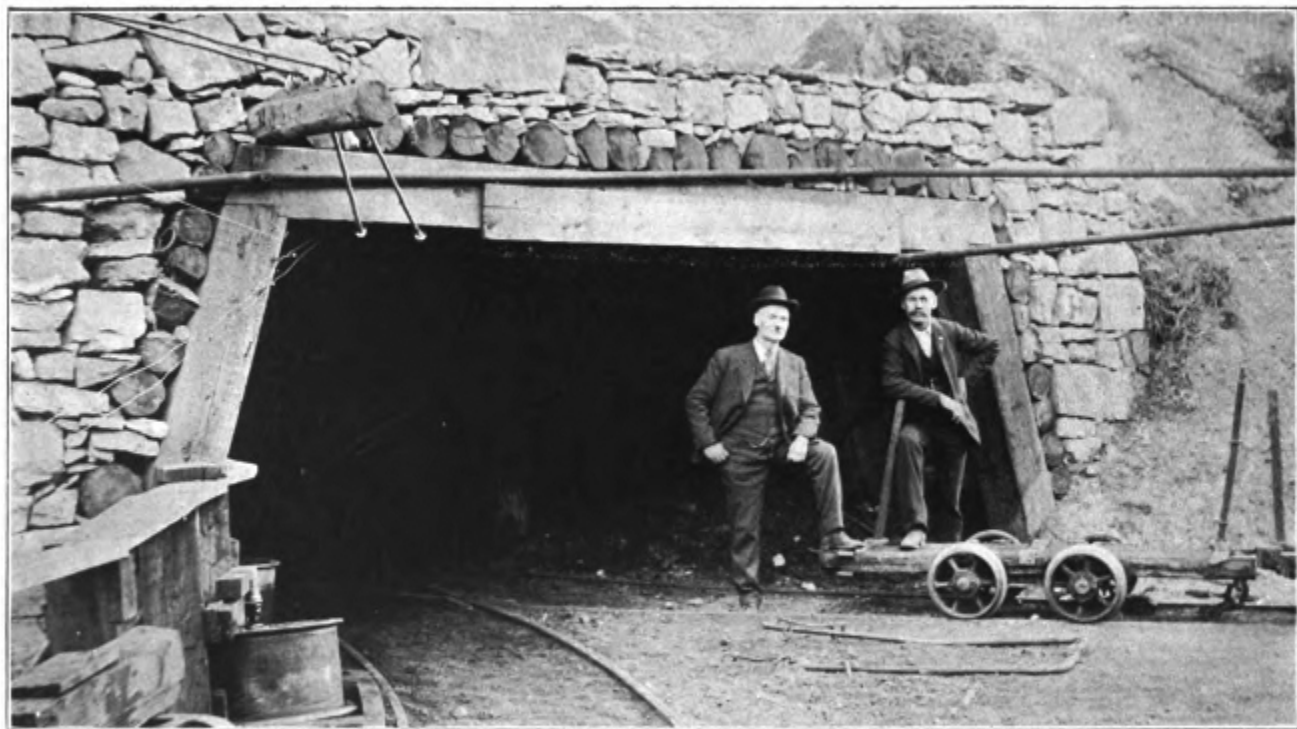
## DESCRIPTIVE LIST OF MINES LOCATED IN CARBON COUNTY.

### WINTER QUARTERS.

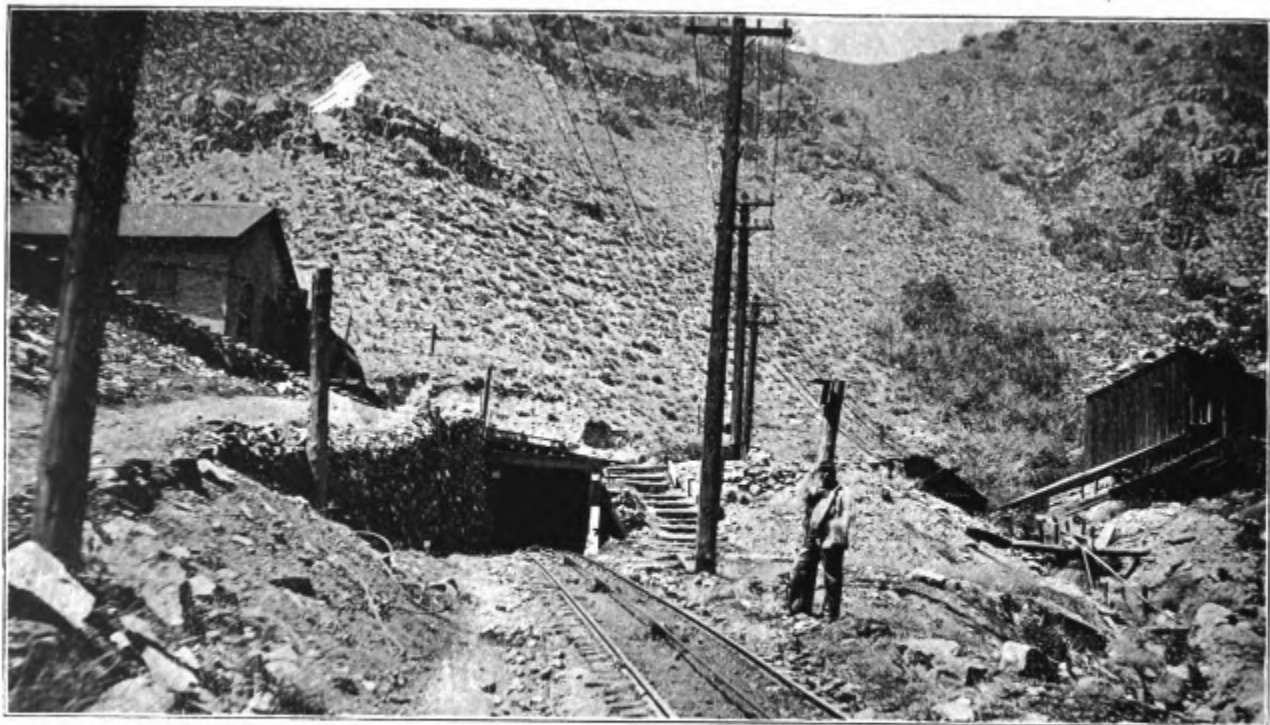
Is located on the Scofield branch of the Rio Grande Western, and is operated by the Pleasant Valley Coal Company, of Salt Lake City. W. B. Williams, General Superintendent; Thomas Parmley, Mine Superintendent, Winter Quarters; Andrew Gilbert, Mine Foreman, Winter Quarters. It consists of one drift opening into number one seam ten feet of clean coal. A fan is used for ventilating purposes, running at the rate of 146 revolutions per minute, producing 56,855 cubic feet at intake and 59,199 at outlet. Employing 233 miners and 42 day men. This mine was inspected five times during the year, twice by Andrew Gilbert, deputy inspector, and three times by inspector. The mine was found each time in a fairly good condition. Coal being mined by pick, haulage being done by electricity. The mine is kept damp by a system of water pipes running through every part of the mine.

### CLEAR CREEK MINE.

Is located on the Scofield branch of the Rio Grande Western, and is seven miles south of Scofield, operated by the Pleasant Valley Coal Company, of Salt Lake City. Thomas Bell, Mine Superintendent; James Russell, Mine Foreman; Thomas W. Thomas, Assistant Mine Foreman. It consists of one drift and one slope, opening into number one seam, from 7 to 14 feet of clean coal. A fan is used for ventilating purposes running at the rate of 75 revolutions per minute, producing 63,025 cubic feet of air at intake and 78,890 cubic feet of air at the outlet. Employing 222 miners and 27 day hands. This mine was inspected five times during the year, twice by Andrew Gilbert, deputy inspector, and three times by the inspector. The mine was found in a fairly good condition each time, with the exception of a heavy squeeze in some parts of the



Mouth of No. 1 mine at Winter Quarters.



Mouth of Castle Gate Mine.



Castle Gate Bridge.

mine, which was brought on by opening and running rooms too wide and robbing pillars. This was brought about by our ex-general superintendent, S. Kedzie Smith, who was working for cheap coal and not for the safety of employes and property. The mine is kept damp by a system of water pipes running through every part of the mine.

#### CASTLE GATE MINE.

Is located on the main line of the Rio Grande Western, and is operated by the Pleasant Valley Coal Company, of Salt Lake City. William Forrester, Mine Superintendent; Robert Williams, Jr., Mine Foreman. It consists of one drift opening, going up on a five per cent grade with from 5 to 10 feet of clean coal. A fan is used for ventilating purposes running at the rate of 147 revolutions per minute, producing 79,800 cubic feet of air at intake and 91,219 cubic feet of air at outlet. Employing 255 miners and 70 day hands. There are 204 coke ovens at this plant, using Sunnyside coal to make coke. This mine was inspected six times during the year by the inspector. The mine was found in a fairly good condition with the exceptions of the rooms opened and run too wide and the pillars robbed, which was caused by using too much economy in getting out cheap coal. The main haulage and traveling ways, and air courses were all in a bad condition, there had been nothing done to them for over a year, and partly filled up with old timbers and rocks, all this occurred during ex-General Superintendent Smith's time.

I am pleased to say that our new superintendent is taking hold and doing all in his power to get things cleaned up. This is one of the things that causes a shortage of fuel in our state. If this had been run right during 1905 it would be producing a larger amount of coal today. This trouble has been a great drawback at nearly all the mines. Coal being mined by pick, haulage done by electricity. The mine being kept damp by a water system running throughout the mine.

## SUNNYSIDE MINES.

Are located on the Sunnyside branch of the Rio Grande Western, and are operated by the Utah Fuel Company, of Salt Lake City. W. B. Williams, General Superintendent, Salt Lake City; William Elwood, Mine Superintendent, Sunnyside; Henry Parmley, Mine Foreman at No. 1 mine, Sunnyside; Robert Williams, Sr., Foreman of Nos. 2 and 3 mines. They consist of two drifts and one slope. No. 1 mine is ventilated by a fan running at the rate of 58 revolutions per minute, producing 74,620 cubic feet of air per minute at the intake and 86,400 cubic feet at the outlet, employing 256 miners and 45 day hands. No. 2 and 3 mines are ventilated by a fan running at the rate of 98 revolutions per minute, producing 48,544 cubic feet of air at the intake and 54,000 cubic feet at the outlet, employing inside and outside 249 men.

These mines were inspected six times during the year, twice by Robert Williams, Sr., deputy inspector and four times by this inspector. The same trouble has occurred here as in Clear Creek and Castle Gate in regard to the rooms being opened too wide and the pillars being too small. The timbering and ventilation was not in a very good condition; the main air courses and traveling ways were also in a bad condition. I am pleased to say that the new superintendent is complying with my instructions as to cleaning up the traveling ways and air courses, and also has the new escapement way about completed in No. 1 mine. Nos. 2 and 3 are in a fairly good condition, all places well timbered and good ventilation, all places watered and kept damp.

All these mines are kept damp by a water system running throughout the mine. The coal is mined by pick, and most of the haulage is done by electricity.

I must say that the Utah Fuel and P. V. Coal Companies mines are in a far better condition today than they were six months ago. The miners and employers are on the best of terms.

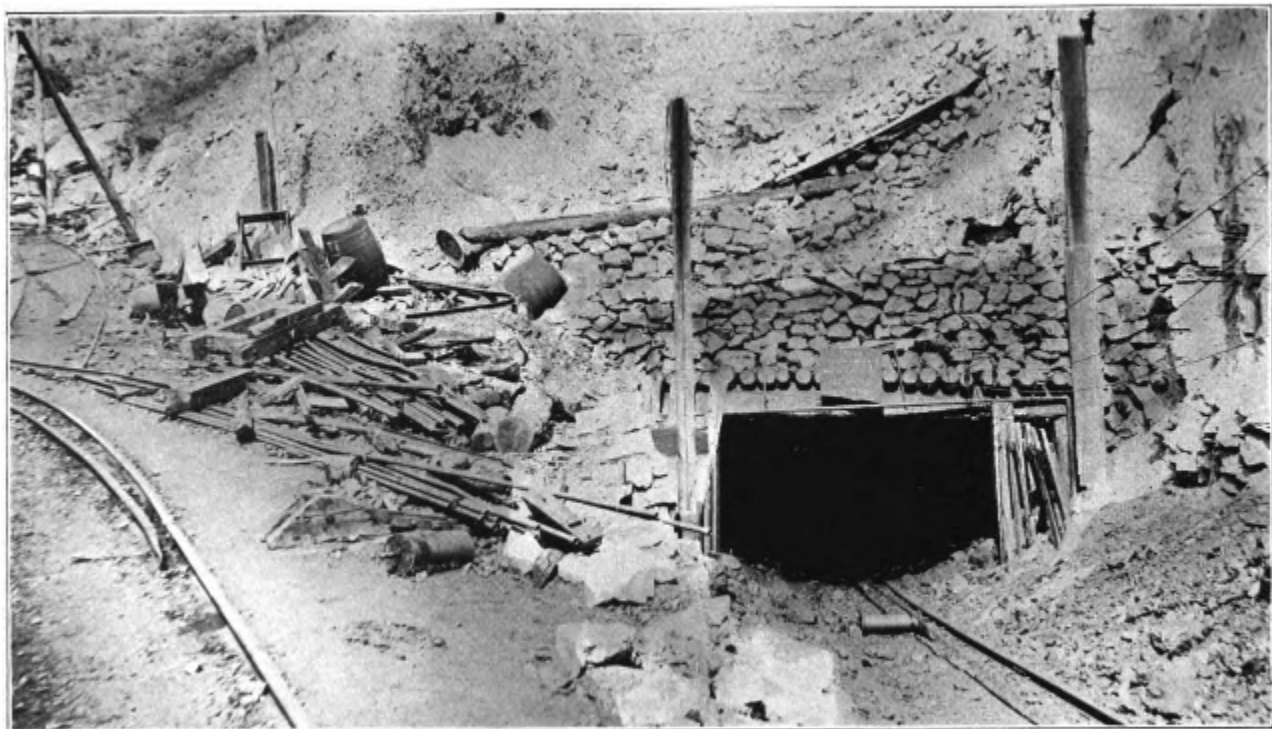
## INDEPENDENT COAL &amp; COKE COMPANY.

Is located four miles east of Helper, on the line of the Rio Grande Western, and is operated by the Inde-



Coke Ovens, Castle Gate.





Mouth No. 1 Mine, Sunnyside.



Mouth No. 2 Mine, Sunnyside.



Johnson Tunnel, with Mr. Joseph B. Johnson at Entrance

pendent Coal and Coke Company, of Salt Lake City, John Potter, Mine Foreman. It consists of one drift opening into number one vein.

This mine will be one of the leading mines of the State in a short time, as it has a large field of number one quality of coal, and plenty of money behind the company to do a great deal of development work. This mine is working about 20 men.

#### SHARP COAL & COKE COMPANY.

Is located three miles east of Helper, on the main line of the Rio Grande Western, and is operated by the Sharp Coal & Coke Co., of Salt Lake City. James A. Harrison, Superintendent, Helper, Utah. This mine has the making of a big mine in the near future.

#### ABERDEEN MINE.

Is located eight miles northeast of Price, on the main line of the Rio Grande Western, and is operated by the Price Trading Company of Price, Utah, on a seam of coal 18 feet thick.

#### OTHER SMALL MINES.

There are 47 other small mines in Carbon County, producing a small amount of coal for domestic use in Castle and Sanpete Valleys. All these mines have been inspected twice during 1906.

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### DESCRIPTIVE LIST OF MINES LOCATED IN SUMMIT COUNTY.

#### GRASS CREEK MINE.

Is located on Park City branch of the Oregon Short Line, eight miles northeast of Coalville, and is operated by the Grass Creek Coal Company, of Salt Lake City. John Pettit, Superintendent, Grass Creek, Utah. It consists of a drift and slope. A fan is used

is operated on the same principle as the rate of 116 feet in the last 100 feet, or about 17.5 cubic feet of air per minute and 17.5 cubic feet at the outlet. During the year 1906. This mine was inspected six times during the year by the inspectors. The mine was always found in a good, safe condition, well timbered, ventilated, and all places kept damp by natural causes.

#### WAGNER MINE.

Is located on the Park City branch of the Oregon Short Line, some three miles east of Coalville, and is operated by the Weber Coal Company, of Salt Lake City. The owner is situated at Coalville: Samuel Clark, Mine Foreman. It consists of one slope opening into a 25 foot vein of good best coal. A fan is used for ventilation purposes, turning at the rate of — revolving 400 times, producing 29,550 cubic feet of air per minute at the intake and 32,130 cubic at the outlet. Expending \$4,000 per year for the mine. This mine was inspected six times during the year. The mine was always found in a good, safe condition, well timbered, ventilated, and all places kept damp by natural causes.

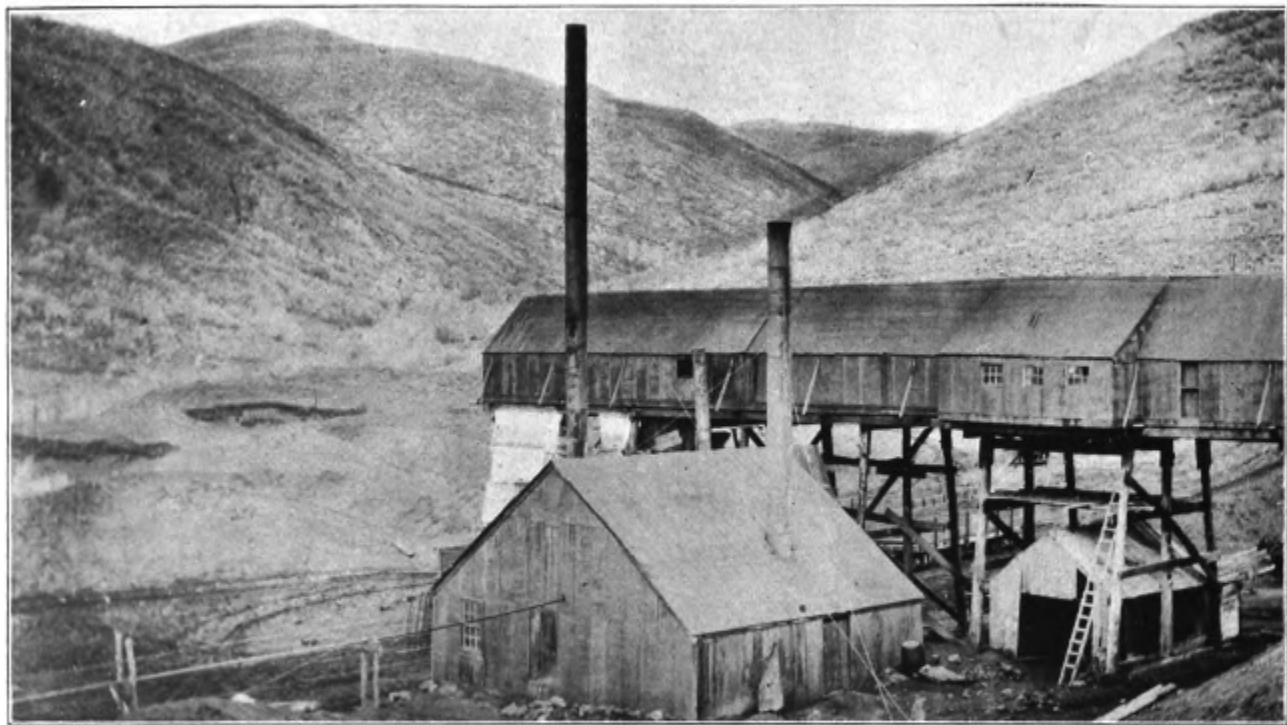
#### OTHER SMALL MINES.

There are three other small mines in this county, all of which are taking out coal for domestic purposes for Weber and Chalk Creek Valleys. These mines have been visited twice during 1906.

### DESCRIPTIVE LIST OF MINES LOCATED IN SANPETE COUNTY.

#### THOMAS MINE.

Is located on the terminus of the Sanpete Valley Railroad, at Morrison, some six miles south of Manti, and is operated by the Sterling Coal & Coke Co., of



Grass Creek Dump.

Salt Lake City. H. R. Thomas, Superintendent, Wales, Utah. It consists of one drift. The ventilation is natural. This mine is employing 15 men in and around the mine. This mine was always found in good, safe working condition, well timbered, ventilated and all places kept damp by natural causes.

There are five other small mines in Sanpete County, two in Wales and three in the head of Huntington Creek, producing coal for local trade.

DESCRIPTIVE LIST OF MINES LOCATED IN UINTAH COUNTY.

There are 31 small openings in Uintah County, about one-third of them are taking out coal for local trade.

DESCRIPTIVE LIST OF MINES LOCATED IN EMERY COUNTY.

There are 45 mines in Emery County, about one-half of them have been taking out coal for local trade and experimenting on making coke, which turned out to be a success, as they made a fair coke out of the coal taken out of Huntington Canyon.

DESCRIPTIVE LIST OF MINES LOCATED IN IRON COUNTY.

There are 15 small mines in Iron County, about one-third of them are taking out coal for local trade.

Grand County has several small mines taking out coal for local trade at Green River and Thompson Springs.

I visited all the small mines at least once during 1906, with the exception of Uintah County.

WINTER QUARTERS, UTAH, Feb. 3, 1906.

*Mr. Gomer Thomas,  
State Coal Mine Inspector,  
Salt Lake City, Utah.*

DEAR SIR:—I herewith hand you report of my visit to Winter Quarters Mine No. 1.

I visited this mine on the 29th and 30th of January, 1906, and found the working places in the mine

in good condition, well supplied with props within 100 feet of working face, and I have every reason to believe that the management are doing all they can to secure the safety of the mine.

The haulage way is in good condition. The mine is well watered throughout, the coal slack is kept wet in all the working places, haulage roads, airways, and traveling roads in the mine. Conditions inside of the dyke between the 10th and 11th rises is such that no sprinkling is needed to keep the coal slack wet, there is enough of water in the coal to keep these places wet.

The ventilation is good except in the 8th and 10th levels off 10th raise. This district has a few more men than should be on one split, but preparations are under way to build an overcast over the 10th raise at the 7th level, and when this is completed that condition will be relieved, there will be two splits where there is one now and then ventilation in that part of the mine will be so much improved.

The main return air way from the bottom of the 10th raise up to the rock tunnel that goes down into No. 3 mine is in bad condition and the area is quite small in a number of places, being partially filled up with caves. All of which increases the resistance that the air meets with in its passage through the mine to the fan. I did not take my air measurements, as I understood you got the weekly measurements every month, but the revolutions of the fan was 150 per minute and the water gauge was three inches.

There are about 200 miners and 50 day men in the mine, and they turned out in the month of January, 1906, 34,500 tons of coal, although they were delayed some by storms and scarcity of railroad cars.

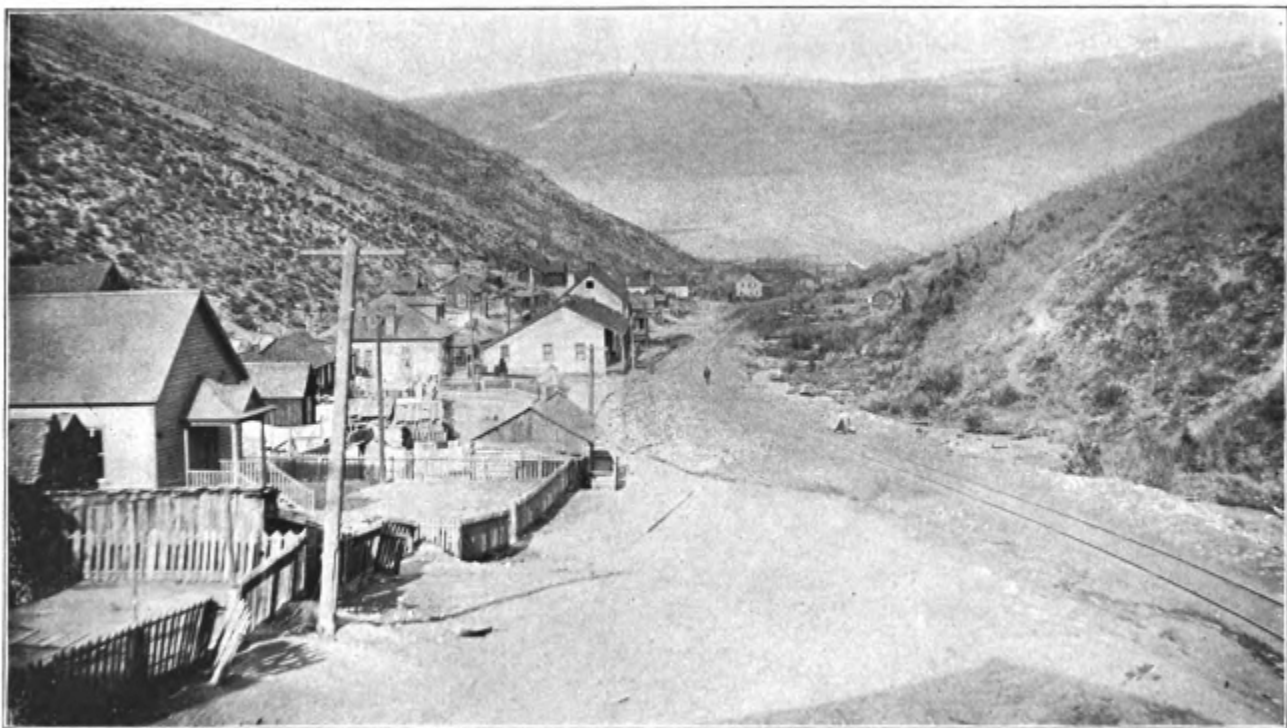
(Signed)                      ANDREW GILBERT.

WINTER QUARTERS, UTAH, February 3, 1906.

*Mr. Gomer Thomas,  
State Coal Mine Inspector,  
Salt Lake City, Utah.*

DEAR SIR:—I herewith report my visit to Clear Creek Mine on January 31 and February 1, 1906:





Winter Quarters, Looking Down Canyon.

Conditions here are much different than at Winter Quarters. Here at Clear Creek they get 85,000 cubic feet of air with 0.4 in water gauge, and at Winter Quarters they get 70,000 feet with a 3 inch water gauge, consequently the ventilation of the mine is a much easier task.

I found the ventilation good except in the 3 west entry; there was some black damp CO<sub>2</sub> mixed with the air on account of part of the air supplied this part of the mine came over the saved ground where the pillars were extracted, and in this way became mixed with the foul gas that escapes from the faults and upper strata. The officials have agreed to remedy this by keeping the air from traveling that way.

The mine is well watered throughout except on part of the 5th west, but the pipe men were fixing a broken pipe there, and I was informed that this part would be watered that night. The men are kept well supplied with props.

The haulage roads and air ways are in good condition. They have about 200 miners and 42 day men in the mine.

They mined 30,500 tons of coal in January, notwithstanding they also had been delayed with storm and waiting on railroad cars.

(Signed)

ANDREW GILBERT.

WINTER QUARTERS, UTAH, May 19, 1906.

*Mr. Gomer Thomas,  
State Coal Mine Inspector,  
Salt Lake City, Utah.*

DEAR SIR:—According to your request I have inspected the Clear Creek and Winter Quarters Mine, and herewith give you my report of the same.

I visited the Clear Creek Mine on the 15th and 16th of May, 1906. The ventilation is good throughout the mine.

The rooms and pillars are well timbered, and they are well supplied with props within 100 feet of the working places.

In the low coal district about from 9 to 12 inches

on a  $1\frac{1}{2}$  cartridge stick is the amount of powder used in a shot or blast. In the high coal, while 20 inches is considered to be the limit, there may be some who once in a while use more, but from the information that I got in going round the mine, from 16 to 20 inches is generally used for a shot.

Soil or clay brought from the outside is generally used for tamping. They are having a good deal of trouble with water just now, the new mine is flooded, and the 5th left entry and the dip workings below the 7th right is flooded with water, so that they cannot get into them at present, but they are putting in larger pipe, and may soon overcome the difficulty.

Coal slack was wet except on the inside part of the 7th west entry. They are turning some rooms here, which makes it somewhat dusty, and the pipe line does not reach it, but they are going to remedy this soon. There are about 170 miners and 40 day men at work in the mine. I consider the mine in good working condition.

I visited the Winter Quarters No. - Mine on the 17th and 18th. The ventilation good except in the dip workings, poor stoppings allow most of the air to leak into the return before it gets to the face of the entry. But this is being remedied; they are repairing the stoppings and in a short time the ventilation will be very good. The rooms and pillars are well timbered and the places are kept well supplied with props within 100 feet of the working places.

From the best information I could obtain, from 14 to 20 inches of powder is used to a shot, and dirt tamping, soil or clay from the outside.

Coal slack and brattice cloth is kept well watered throughout the mine. I traveled the return air way, as you desired me to do, from the bottom of the 10th raise to the fan, and it is in about the same condition as it was three months ago. There are a number of caves in it, some of them quite long, and although they have been and still are able to crowd enough air through it to ventilate the mine, I consider it in a poor condition, and it will require a great amount of labor to be expended on it to put it in a condition to supply the demands of the mine in the future. The caves are leveled off so that the friction of the air traveling over

them is reduced as much as it well could be at those points under present conditions. I think the smallest area is between the overcast over the dip and the one over the bottom of the 8 rise rope road.

With these exceptions I consider the mine in good working condition.

Yours truly,  
(Signed) ANDREW GILBERT,  
Deputy Inspector.

SUNNYSIDE, UTAH, February 22nd, 1906.

*Mr. Gomer Thomas,*  
*State Coal Mine Inspector,*  
*Salt Lake City, Utah.*

DEAR SIR:—I respectfully submit the following report to you.—On February 17th, 1906, I made a careful examination of Sunnyside Mines No. 2 and 3, with the following results. I found the haulage roads, traveling roads, air courses and overcasts in good condition, the rooms in good and safe condition with currents as required, the pillars and stumps in as good condition as they can be, with the air traveling as required and both mines well watered, altogether the mines are in a good and safe condition.

No. 2 Old Mine.	Water Canon No. 3.
Barometer.....23.40	Fan Rev.... 100
Thermometer..29	Intake,.....18,000 cubic feet of air.
Fan Rev.....60	Return.....20,000 " " "
Water Gauge..6-10.	
Intake.....	49,000 " " "
Return.....	53,000 " " "

The company is opening a new mine in Water Canon, in the old vein, they are in 180 feet and just got the full thickness of coal.

Yours respectfully,  
ROBERT WILLIAMS,  
Deputy Inspector.

SUNNYSIDE, UTAH, February 22nd, 1906.

*Mr. Gomer Thomas,*  
*State Coal Mine Inspector,*  
*Salt Lake City, Utah.*

DEAR SIR:—I herewith submit the following report to you, on the Sunnyside Mines No. 1 and 4. I visited these mines on February 19th with the following results. I found the hauling roads traveling roads, air courses, and overcasts in good condition, and the rooms in good safe condition, they are working the new mine considerable now, they are using naked lights in general, I found two places working with safety lamps. The mine generates some firedamp but they brattice well and strong currents of air going through all the time so I consider the mine perfectly safe, the pillars and stumps are in good condition, all places well watered and timbered.

The mines in Sunnyside are working every day. I examined the sacles and found them to be correct.

Yours respectfully,

ROBERT WILLIAMS,  
 Deputy Inspector.

SALT LAKE CITY, UTAH, July 23rd, 1906.

*Mr. W. B. Williams,*  
*Gen. Supt. Utah Fuel and P. V. Coal Co.,*  
*Castle Gate, Utah.*

DEAR SIR:—In compliance with the Mining Laws of Utah I herewith hand you a report of my visit of inspection to your mines, to which I made several visits during the last quarter.

On my visit of inspection to Sunnyside mines I found them in a fairly good condition with the exception of No. 4. This mine is not as I would like to see it, as the ventilation is not as good as it ought to be. This is mostly on account of having the one door on the slope. When this door is open the air is shut off in a great many of the working places, and as some of

the entries give off a good deal of gas and while the door is open it gathers and becomes dangerous.

I would suggest here that you would rush the work on the three overcasts that are now started, which would do away with all this danger.

I find that all the stoppings in No. 4 are made of lumber instead of rock as the law requires. I also find that the rooms are turned too wide off the entries, leaving too small of a pillar for the safety of the mine.

All the main haulage roads are piled up with coal and dirt which makes it very bad and dangerous for those who have to travel over them and work on the same. I find this latter condition in all the mines.

As to inspection of Nos. 2-3 and 5 mines would say that Robert Williams, Sr., inspected them and found them in fairly good condition.

On my visit of inspection to Castle Gate Mine I found them, in general in a good condition, with the exception of the rooms being driven too wide and the roads are in a bad condition on account of their being filled up with coal and dirt.

The main return and traveling ways are in a very bad condition on account of being filled with debris making them too low for proper travel and to carry the amount of air necessary. I hope you will see to this as soon as possible.

As to inspection of Winter Quarters and Clear Creek Mines will say Andrew Gilbert inspected them twice during the last quarter and found both mines to be in very good condition.

There are several important matters I desire to talk over with you in the near future.

Respectfully yours,

GOMER THOMAS,  
State Coal Mine Inspector.

SALT LAKE CITY, UTAH, April 24, 1906.

*Hon. John C. Cutler, Governor State of Utah,  
Salt Lake City:*

SIR:—The following is a copy of my report to the American Asphaltum Company:

This is to certify that I have this day, accord-

ance with section 15 of the Laws of Utah, 1905, made an examination of the Pariette Mine.

I found that there had been an explosion, resulting in the loss of the lives of four men by suffocation and which explosion was caused in my opinion by the igniting of a small pocket or feeder of carbonated hydrogen gas, as I found several small feeders in the lower south level, at the bottom of the shaft, which is eight hundred sixty feet deep. I carefully examined the shaft and found it was in a thoroughly good, safe working condition.

The shaft and the workings were all wet. The mine had been closed down since 9 p. m., April 18th to the time I made the examination. I went down twice after sending my safety lamp down on the cage. I took the mine foreman and two other men with me. I found the ventilation was good under the circumstances and satisfactory: I also found the ladder was about twenty-five feet from the bottom of the shaft, which would make it so that a man could climb to the ladder.

In my opinion all of the men that were working in the shaft at the time of the accident, became bewildered on account of not having experience in such accidents. As the explosion was very feeble, the flame did not cover over twenty feet of ground, hardly enough to heat the Gilsonite; but caused enough smoke and after damp to cause suffocation.

There were six men in the mine at the time, two of them were on the sixty foot level, two worked in the lower level and two in the shaft. One of the men in the lower level must have set off a small amount of gas. They then ran out of the level, which was twenty-five feet long, and went down the shaft fifteen feet to the bottom, where the other men were working. They then called on the men on the sixty foot level, to ring the danger signal and ring down the cage. The cage came down to where it had been stopping all day—at the bottom of the shaft; they then called on the men on the sixty foot level to lower the cage. This was done and the signal given to hoist. But when the engineer tried to hoist, he found the cage was fast and could not move.

According to the evidence I got from these men

that were working on the day shaft, the men in the shaft were getting ready to put in a square set; in order to do this they had taken out the two planks that were used to run the cage from the bottom up, it looks to me as if they got excited and did not guide the cage past the bottom of the set of timbers, which were four feet from the bottom, the men on the sixty foot level started down to help them free the cage; they got down about thirty feet and had to return on account of smoke, they then started for the top up the ladder, which was eight hundred feet to the top of the shaft, and gave the news of the accident, then the rescuing party started down the ladder and when they got to the sixty foot level they also had to turn back to the sixty foot level and did not get to the men for some four hours after the accident, the fan had been going all this time; the air pipes were down to the lower level and also a two inch air compressor pipe was working right to the bottom.

As to the cause of the explosion, it is one of those that are unforeseen. According to the evidence that was given me by the men that were working on the morning shift, and who quit work at 4:30 p. m., the ventilation was good, and the mine was clear of gas. At 4:45 p. m. the night shift had started to work and at that time the explosion occurred, which was only fifteen minutes after the day men had gone up, so it is reasonable to think that they struck a small feeder of carbonated hydrogen. I will say that the mine should now be worked with an approved safety lamp at this and the lower levels.

Prior to the accident there had never been any evidence of the existence of a sufficient volume of gas to warrant the installation of safety lamps and no real danger from gas has ever existed in this mine prior to this time of the explosion, April 18th. The possibility of a dangerous volume of gas again being encountered in the future operation of the mine must now be recognized and prudence requires that safety lamps be installed on the fifteen feet above shaft level and I accordingly order that such lamps be used on this level in the future.

I do not wish this order to be construed as a criticism of your failure to use such lamps in the past.



But on the contrary, my own inspection and the most thorough investigation possible, have led me to believe that open lights were proper and safe at all times prior to this accident, and there has been no discoverable evidence to warrant any interference of any danger whatsoever from such lamps.

Yours truly!

GOMER THOMAS,  
State Coal Mine Inspector.

#### CASTLE GATE MINE SHOOTING REGULATIONS.

The following regulations for drilling shot holes, charging and firing the same, will hereafter be in effect at Castle Gate Mine, and must be strictly carried out by all parties.

1. The mining must extend at least six inches beyond back of holes in all cases and 12 inches at all places beyond and towards the right side of holes.

2. All holes must be at least  $2\frac{1}{2}$  feet in length. No shorter holes will be fired.

3. All coal dust must be extracted from holes before they are charged.

4. No holes must be charged with more than 5 sticks of powder.

5. No material whatever except the wet wood pulp furnished by the company must be used in tamping holes.

6. No shots shall be fired unless within 30 yds are in wet condition so that dust cannot be raised by windy shot.

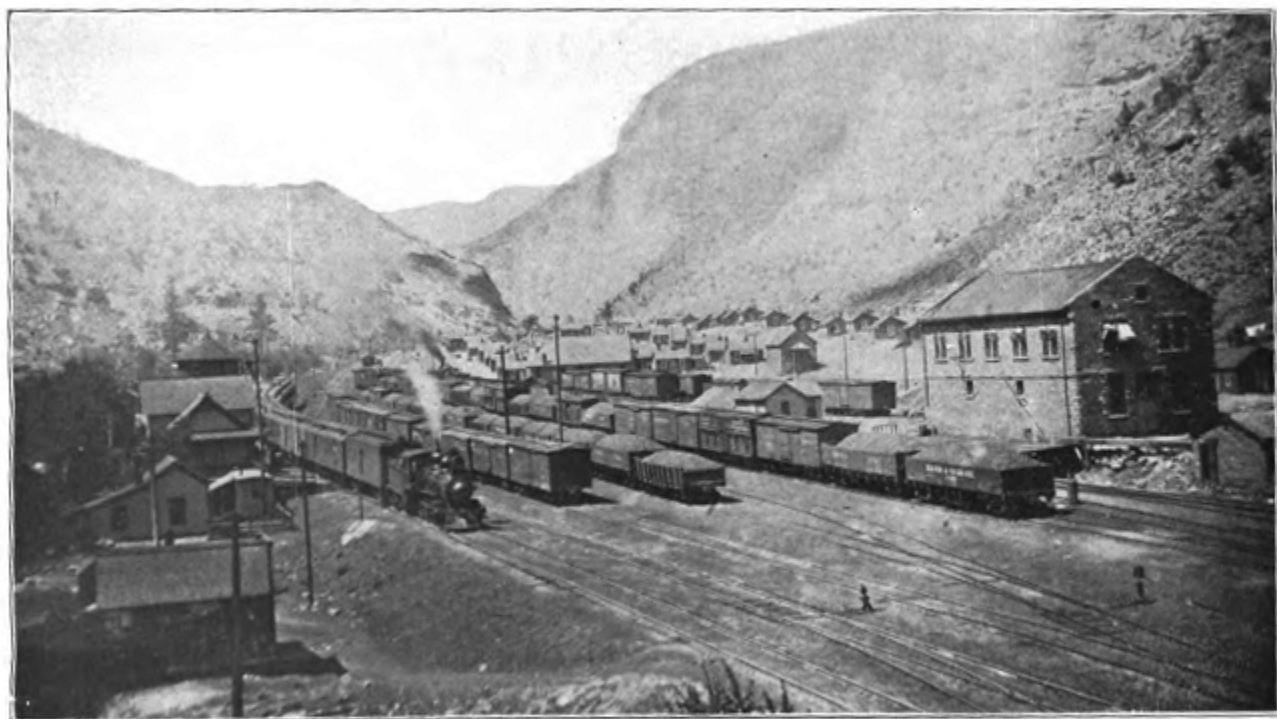
7. Standing holes or parts of standing holes must not be recharged.

8. The hole in tight corner must be at least 1 foot from rib at back end of hole.

9. In solid faces holes must not be more than 5 feet apart horizontally, and not less than two such holes will be fired.

10. In coal over six feet high no hole must be more than 5 feet in height above the floor at back of hole in shooting bottom bench.

11. In high coal bottom bench must be shot down before shots are fired in top bench.



Castle Gate, Looking up the Canyon.

12. The object of the above rules is to prevent and remove the danger from blown out or windy shots, and it shall be the duty of all firemen in addition to the above rules, to refuse to shoot any holes which in their judgment may be dangerous whether the circumstances are fully covered by the rules or not. The firemen are expected to always be on the safe side.

W. B. WILLIAMS,  
Gen. Supt.

WM. FORRESTER,  
Mine Supt.

FOLLOWING ARE THE IMPROVEMENTS MADE AT THE  
CASTLE GATE MINE DURING 1906.

In the work of improvements at Castle Gate, a new box car loader to handle nut coal has been installed, and is working very nicely. A large reservoir is also under construction, and which we hope to have completed in a few weeks. This will enable us to clean out the old reservoir once or twice a year, as the occasion may require, and will also furnish a better quality and larger quantity of pure water than we have been having heretofore.

A large amount of money has been expended in the latter part of this year for cleaning up the traveling roads and the air courses, and for repairs to buildings, etc., in and around the mine.

A large number of mine cars have been cut down in height at considerable expense in order to enable us to mine and in the low coal that we are operating at present in the dip workings, and also in the western part of the works here.

Several changes have been made in the top works of this plant and will prove economical in handling the tonnage and other operation of the work in the future. Within the past thirty days a change has been made in the lighting system by installing the three wire system. We have also established a system of lights along the main street of the town; this is a great improvement in the way of traveling after the sun goes down.

A steam line has been run from the power house to the hotel that will replace the present method of heating the same by stoves, thereby giving better satisfaction, and minimizing the danger from fire.

## IMPROVEMENTS AT WINTER QUARTERS.

At this camp, a large number of new mine cars have been added to the equipment. A Christy Box Car Loader has been installed, and is handling the coal to our entire satisfaction. A new dumping chute for run of mine coal has also been put in at this mine, and a roof over the bridge and tipple will be completed by the 1st of December, which will shelter the men from the storms, and also add materially to the rapid handling of the output at this place.

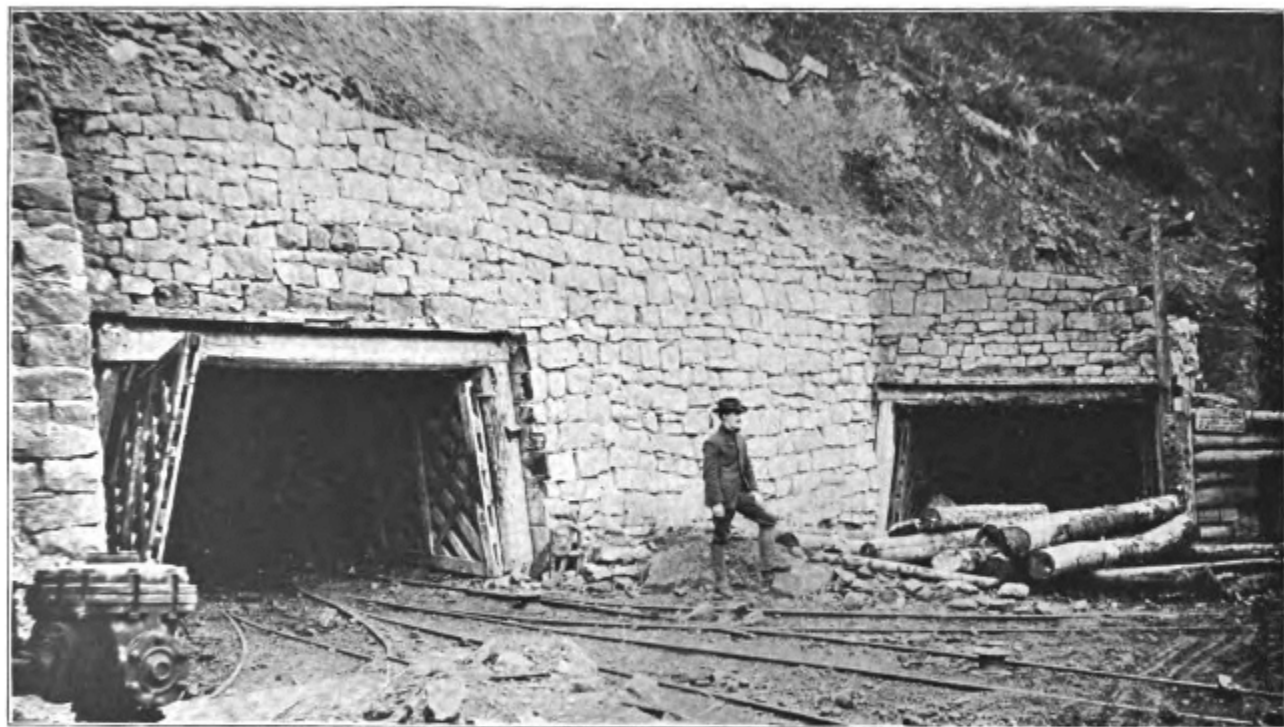
A new tunnel is planned out, and work on this will commence December 1st to reach the coal in old No. 4 mine. A large body of coal has been left in old No. 4 mine, and quite an extensive working face has been developed, and this tunnel is intended to bring the coal from that point down through No. 1 mine, thereby enabling the handling of this product over one tipple. This tunnel will be in the neighborhood of a little over 900 feet in length through solid rock, but the benefits to be derived in the future operations at this plant will justify us in making this expenditure.

## IMPROVEMENTS AT CLEAR CREEK.

At this camp during the year 1906, we have installed one new Triplex Electric Pump in the mine, one 66 inch by 16 foot horizontal tubular boiler has been added to this plant, and an additional loading chute for run-of-mine coal in connection with the present tipple, and two new box car loaders, one Ottumwa Loader and one Christy Loader, will be installed by the middle of December, and also a new loading track, which will make the 5th at this point, will be in, we hope, by December 1st.

No. 2 mine has been driven to a distance of about 2000 feet from the opening and some cross entries have been driven off of the main entries. A steam hoist is now being put in position to haul the coal from this mine, and do away with horse power that has been in use up to the present.

With the increased facilities for handling the product here, we expect by the 1st of January to produce, at least, 1800 tons per day from these mines.



Mouth of Mine at Clear Creek.



Hospital at Clear Creek.

The large Boarding House has been remodeled and repainted, and it is equipped with all the facilities and appurtenances for taking care of a large number of boarders, and is now considered one of the finest Boarding Houses or Hotels in this part of Utah. A steam line has been run from the power house to the Boarding House that will replace the present method of heating the same with stoves, thereby giving better satisfaction and minimizing the danger from fire.

The Store and Office Building has also been touched up with a fresh coat of paint, a fence has been built around the Hospital, the yard graded and seeded, and has produced a very nice lawn there, which is quite an embellishment to this feature of the mining camp.

#### IMPROVEMENTS AT SUNNYSIDE.

At Sunnyside, a large amount of money has been expended in improvements, and new machinery, and part of which has been installed, and the other part of which is on the road, and will be installed just as soon as it reaches Sunnyside.

A new mine, No. 5, has been opened in Water Canon, and driven for a distance of about 1500 feet. The indications are that this will be a large producer in the near future. Nothing at present has been driven except the entries, no rooms have been turned as yet in this mine. A new bridge has been built across the canon enabling the handling of the cars and tonnage from this mine.

The fans at Nos. 2 and 3 Mines have been changed from steam to electric driven by installing electric motors at both places.

Two new boilers of 125 H. P. each were installed in the fore part of the year. A new Williams Jumbo coal crusher with an Ideal Engine 19 x 18 to run it has been put in operation on the No. 2 side of the crushing plant.

Thirty new coke ovens have been completed, and equipped with the necessary tracks, larry cars, etc., to operate the same, making a total of 480 ovens in operation at present. One hundred and seventy additional ovens are just about completed, and will, no doubt, be in action by February 1st. This new block of ovens is

being built to the south and east of the present coke plant.

A large bin is erected with a capacity of 1800 tons to take care of the crushed coal for supplying these ovens, and it is expected and hoped that the necessary tracks will be put in, and permit us to begin operating these ovens by the 1st of February, as stated above. The necessary larry cars and electrical equipment are on the ground and partially installed to handle the output from this new plant.

A large water line from Sunnyside camp up over the mountain and down to Range Creek was completed and put in operation early in the year, and it is now supplying a sufficient quantity of very fine water for domestic and other uses at the Sunnyside camp. The magnitude of an undertaking of this kind can only be appreciated after one has climbed the mountain some 2000 feet higher than the altitude at the Sunnyside Depot.

Forty-eight substantial and comfortable cottages have been built this year, and are, at present waiting in the hands of the painters, who expect to have the same completed within the next week or ten days.

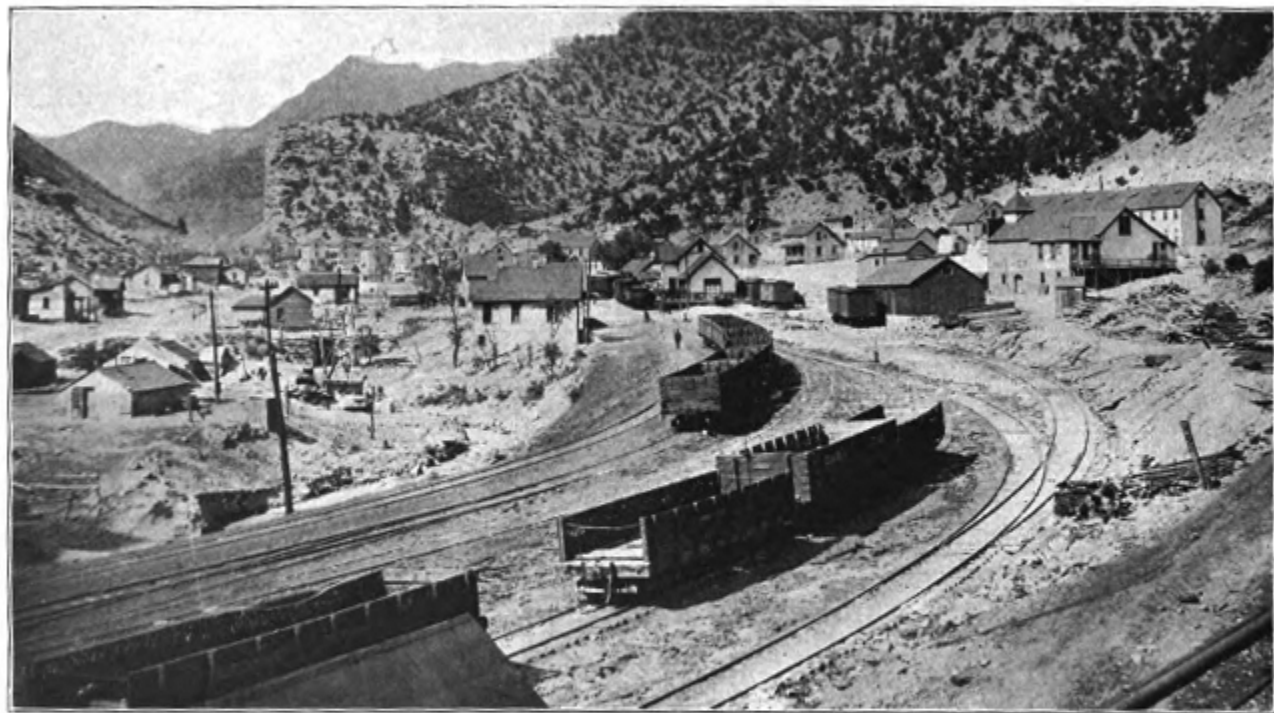
Three thousand feet of eight inch pipe had been installed and also 2500 feet of three inch cast iron pipe to care for the new ovens and the new cottages, so that there will be ample fire protection as well as sufficient water facilities for all domestic purposes.

A new store building has also been erected in the lower end of the Sunnyside camp in order to accommodate the people living at that end of town, and remove the necessity for their traveling a long distance to the old store.

A new thirteen ton Generator Electric Locomotive has also been purchased to assist in handling the output in these mines, and one hundred new mine cars are being built to aid the operations; also an order has been placed for one hundred additional cars for this plant.

In addition to these improvements mentioned, we are now spending a sum of about \$5000.00 in replacing three inch water pipe in the upper part of town with a six inch pipe. This improvement will prove of great  
\* in giving a larger supply of water, and also in





Sunnyside, Looking North.

case of fire, will be far superior to the capacity of the water line in use at present.

At Sunnyside, a large comfortable wash house has been built close to the hotel, the same has been equipped with shower baths, and the necessary apparatus for the men to bathe in, also a large number of lockers have been made so that each border can put his clothing away in safety under lock and key.

At all the mining camps, in addition to the improvements mentioned above, large sums of money have been spent in cleaning up the road ways and improving haulage tracks and air ways that have been over looked in previous years.

At all the mining camps, changes have been made in handling the Boarding Houses, the same have been renovated and remodeled to some extent, and placed in the hands of attentive and competent people, who are giving satisfaction to the patrons.

Following is a statement of the average wages of the miners at the various mining camps for the year, and also list of wages paid to all company men:

Miners:

Castle Gate	\$3.58	per day.
Clear Creek	3.78	"
Winter Quarters	3.62	"
Sunnyside No. 1	3.32	"
Sunnyside No. 2	3.63	"

Coke Pullers, \$2.82 per day.

Engineers, Power House, \$90 per month.

Engineers, Crushers, 34 $\frac{1}{2}$ c per hour.

Mechanics, 37 $\frac{1}{2}$ c per hour.

Firemen, \$82.50 per month.

Blacksmith, 40 $\frac{1}{2}$ c per hour.

Weighman, pit car, \$82.50 and \$60 per month.

Weighman, railroad car, \$60 per month.

Dumpers, 34 $\frac{1}{2}$ c per hour.

Outside laborers, 27 $\frac{1}{2}$ c per hour.

Spraggers 18 $\frac{1}{2}$ c per hour.

Couplers 13 $\frac{1}{2}$ c per hour.

4-4 Car Droppers, 31 $\frac{1}{2}$ c per hour.

Stable Boss, \$75 per month.

Stable Men, \$70 per month,

Teamster, 28½c per hour.  
 Carpenter, 37½c per hour.  
 Fire Boss, \$90 per month.  
 Brattice Men, 34½c per hour.  
 Wire Men, 37½c per hour.  
 Timber Men, 34½c per hour.  
 Water Men, 34½c per hour.  
 Track Men, 37½c per hour.  
 Roller Men, 34½c per hour.  
 Motor Men, 40½c per hour.  
 Hoist Men, 37½c per hour.  
 Rope Riders, 37½c per hour.  
 Drivers, 34½c per hour.

In addition, I wish to add, that the improvements installed and the large amount of money expended for installing the same are merely a bagatelle compared to the intended changes and additions to the property that will, no doubt, take place next year, as we now have under consideration the development of new mines and a long rock tunnel for carrying water by gravity system at Sunnyside, and for bringing necessary timbers from Range Creek, which is expected will supply all of the mining camps now in operation.

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## DESCRIPTIVE LIST OF HYDRO-CARBON MINES IN UINTAH COUNTY.

### THE GILSON ASPHALTUM COMPANY.

Located at the terminus of the Uintah Railroad, sixty miles northwest of Mack, Colo., on the Rio Grande Western, and is operated by the Gilson Asphaltum Co., Dragon, Utah, under the entire supervision of Captain Cooley, who is also general manager of the Uintah Railroad. They are now working three shafts and one drift on a seam of gilsonite seven feet thick, employing 38 men. The mine is ventilated by natural ventilation; they have a pipe line nearly completed, which will act as a water system for sprinkling the mine.

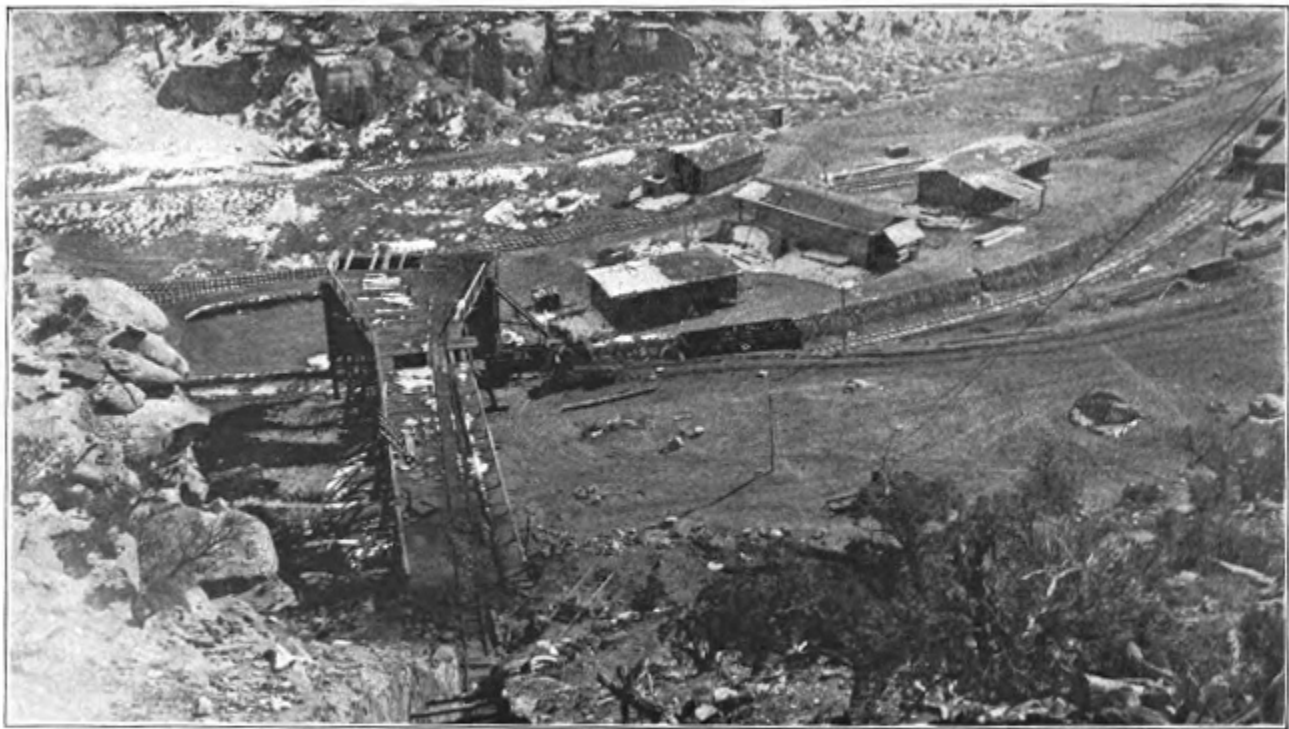
On my last visit Nov. 1, I found the mine in a fairly good condition as to timbering and ventilation,



**Gilsonite Mine at Dragon.**



Dragon Hotel.



Dragon Mine of Gilsonite.

but found the mine dry and dusty, which is against the law, and under this condition the mine becomes very dangerous, so my instruction was to put in water system at once. The management promised to do so and have it completed in three weeks. The production of this mine was 9,803 short tons, at a cost of \$5.00 on car at mine, and \$10.00 freight to Mack, which would be \$15.00 per ton f. o. v. on main line of Rio Grande Western, and is selling on the eastern market for about \$35.00 per ton. Valuation of this product on the market \$343.105.

This is the largest gilsonite company in the west, and have spent thousands of dollars in development work, without the cost of building 56 miles of railroad from Mack to Dragon. They have millions of tons of gilsonite in sight. Wages paid at this mine: Superintendent, \$125.00 per month; miners, \$3.00 per day for 8 hours' work. The mine is lighted by electricity. I am pleased to say that the management is doing all that is in their power to comply with the law as to the safety and comfort of their employes.

#### AMERICAN ASPHALTUM ASSOCIATION.

Located 10 miles northwest of Dragon, on the Uintah Railroad, and is operated by the American Asphaltum Association of St. Louis, Mo., and is under the supervision of Max E. Smith of Dragon. On my last visit to this mine I found the mine in a good and safe condition, all places well timbered, employing 6 men under a lease. The mine is opened with a cut on a six foot vein of gilsonite. Cost of mining is \$3.00, \$3.00 freight from mine to Dragon and \$10.00 from Dragon to Mack. The mine produced 378 short tons during the year, with a valuation of \$13,230.00.

#### RAVEN MINE.

Located a little northwest of Fort Du Chesne, and operated by the Raven Mining Company, and is under the supervision of Mr. Farren. I made no visits to this mine during the year, but requested a data on their output, and they did not respond, so I cannot

give an account of their development. As near as I can find, they are employing about 30 men doing prospecting work.

There are several other companies in this county doing a little development work, employing about 40 men.

## DESCRIPTIVE LIST OF HYDRO-CARBON MINES IN WASATCH COUNTY.

### PARIETTE MINE.

Located at Pariette, 30 miles south of Fort Du Chesne, operated by the American Rubber and Asphaltum Company of Chicago, Ills., under the supervision of Mr. D. Rawstron, J. Chalesworth mine foreman. This mine has been shut down since April 18, excepting a few men who are doing assessment work. On my last visit to the mine on April 24th, I found there had been an explosion, resulting in the loss of four lives by suffocation. A full report of the same will be found in my report to the company. This mine employed 35 men up to the time of the accident, producing 1,350 short tons of gilsonite, at a valuation of \$47,250.

There are several other small mines in Wasatch county, and one ozokerite mine 7 miles northeast of Tucker, employing something like 30 men, prospecting and doing development work. At present they are putting in a steam hoist. I have but very little data of this mine, on account of not making any visits to this mine.

## DESCRIPTIVE LIST OF HYDRO-CARBON MINES IN UTAH COUNTY.

### TUCKER ASPHALTUM MINE.

Located 8 miles northeast of Tucker on the main line of the Rio Grande Western, operated by the Amer-



ican Rubber and Asphalt Company of Chicago, Ills., under the supervision of D. Rawstron, Gomer Reese mine foreman. I have made several visits to this mine during the year. On my last visit of inspection to this mine, on Nov. 13, I found the mine in general in a good condition, well timbered and ventilated and all places kept damp. This mine is worked under a long wall system. They are producing about 30 tons of asphaltum rock per day, which is shipped to Chicago for treatment, employing about 40 men in and out of the mine.

The ozokerite mines in this county at Colton, have been closed down during 1906, for causes unknown to the inspector.

SALT LAKE CITY, UTAH,  
April 24, 1906.

*American Asphaltum and Rubber Co., Woman's Temple,  
Chicago, Illinois:*

GENTLEMEN:—This is to certify that I have this day, according to section 15 of the Laws of Utah of 1905, made an examination of the Pariette mine.

I found that there had been an explosion, resulting in the loss of the lives of four men by suffocation, and which explosion was caused by the igniting of a small pocket or feeder of carbonated hydrogen gas, as I found several small feeders in the lower south level, at the bottom of the shaft, which is eight hundred and sixty feet deep. I carefully examined the shaft and found it was in a thoroughly good, safe working condition.

The shaft and the workings were wet. The mine had been closed down since 9 p. m. April 18th to the time I made the examination. I went down twice after sending my safety lamp down on the cage. I took the mine foreman and two other men with me. I found the ventilation was good under the circumstances and satisfactory; I also found the ladder was about twenty-five feet from the bottom of the shaft, which would make it so that a man could climb to the ladder.

In my opinion, all of the men that were working

in the shaft at the time of the accident, became bewildered on account of not having experience in such accidents. As the explosion was very feeble, the flame did not cover over twenty feet of ground, hardly enough to heat the gilsonite, but caused enough smoke and after damp to cause suffocation.

There were six men in the mine at the time, two of them were on the sixty foot level, two worked in the lower level and two in the shaft. One of the men in the lower level must have set off a small amount of gas. They ran out of the level which was twenty-five feet long, and went down the shaft fifteen feet to the bottom where the other men were working. They then called on the men on the sixty foot level to ring the danger signal and ring down the cage. The cage came down to where it had been stopping all day—at the bottom of the shaft; they then called on the men on the sixty foot level to lower the cage. This was done and the signal given to hoist. But when the engineer tried to hoist, he found the cage was fast and could not move it.

According to the evidence I got from the men that were working on the day shift, the men in the shaft were getting ready to put in a square set; in order to do this they had to take out the two planks that were used to run the cage from the bottom up. It looks to me as if they got excited and did not guide the cage past the bottom of the set of timbers, which were four feet from the bottom, the men on the sixty foot level started down to help them free the cage; they got down about thirty feet and had to return on account of smoke, they then started for the top up the ladder, which was over eight hundred feet to the top of the shaft, and gave the news of the accident, then the rescuing party started down the ladder, and when they got a little below the sixty foot level they also had to turn back to the sixty foot level and did not get to the men for some four hours after the accident, the fan had been going all this time, the air pipes were down to the lower level and also a two inch air compressor pipe was working right to the bottom.

As to the cause of the explosion, it is one of those that are unforeseen. According to the evidence that was given me by the men that were working on the

morning shift, and who quit work at 4:30 p. m., the ventilation was good, and the mine was clear of gas. At 4:45 p. m. the night shift had started to work, and at that time the explosion occurred which was only fifteen minutes after the day men had gone up, so it is reasonable to think that they had struck a small feeder of carbonated hydrogen. I will say that the mine should now be worked with an approved safety lamp at this and the lower levels.

Prior to this accident there had never been any evidence of the existence of a sufficient volume of gas to warrant the installation of safety lamps and no real danger from gas has ever existed in this mine prior to this time of the explosion, April 18th. The possibility of a dangerous volume of gas again being encountered in the future operation of the mine, must now be recognized, and prudence requires that safety lamps be installed on the fifteen feet above shaft level, and I accordingly order that such lamps be used on this level in the future.

I do not wish this order to be construed as a criticism of your failure to use such lamps in the past, but on the contrary, my own inspection and the most thorough investigation possible have led me to believe that open lights were proper and safe at all times prior to this accident, and there has been no discoverable evidence to warrant any interference of any danger whatsoever from such lamps.

Yours truly,

GOMER THOMAS,

State Coal Mine Inspector.

— — —  
SALT LAKE CITY, UTAH,  
November 19, 1906.

*American Asphaltum, Rubber and Gilsonite Co.,  
Chicago, Illinois:*

GENTLEMEN:—In accordance with Section 13 of the Coal and Hydro Mining Laws of the State of Utah for 1905, I herewith hand you my report of my official visit of inspection to your asphaltum mines, eight

miles northwest of Tucker, in the county of Utah, on November 13, 1906.

I went through the mine in company with Mr. D. Rawstron and Mr. Gomer Reese. I found the mine in a good, healthy condition, well timbered and good ventilation. I found in places large piles of asphaltum stored away ready to ship. As to the vein of asphaltum, I found it looking very favorable, it would average about 14 inches in width. I was pleased to see that there had been a great improvement made in the mine since my last visit, as to safety and ventilation.

There were 25 men working in the mine and 15 teams hauling to the railroad. While at the mine I examined one of the employes as to the competency to act as mine fire boss, so I issued a certificate to Mr. Richard Smith, who I found was a practical miner and also a sober man, I gave him instructions as to his work, that he had to visit the mine every morning, report the condition in regards to its safety, also go through the mine before the men started to work after dinner, on leaving the mine to report in a book, which is kept for that purpose, and also fill a blank of the general report of the day, which should be signed by the fire boss and mine foreman, the original to be sent to the general office and a copy to be kept in the office at the mine. I furnished Mr. Rawstron with blanks for the same. I also sent him a copy of the general rules which must be posted at the mine. I also gave Mr. Reese, the mine foreman, instructions to comply with the mining laws of Utah. If he carries out my advice you will always be on the safe side of the law.

Hoping you will continue on with the good work.

Respectfully yours,

GOMER THOMAS,

State Coal Mine Inspector.

SALT LAKE CITY, UTAH, November 5, 1906.

*Mr. W. S. Cooley, General Manager Uintah Gilson  
Asphaltum Co., Dragon, Utah.*

DEAR SIR:—In accordance with sec. 13 of the Coal and Hydro Carbon Mining Laws of the State of Utah of 1905, I herewith hand you my report of my official

visit of inspection to your Ginsonite Mine, at Dragon, Utah, on November 1st and 2nd.

I went through the mine and found it in a fairly good condition, with the exception of the mine being drp and dusty, the ventilation and timbering was good.

My suggestion would be for you to put in your water system as soon as it is possible for you to do so, as the mine is in a dangerous condition with the dry dust you have in the mine at present.

I will call your attention to sec. 10 of the Coal and Hydro Carbon Mining Laws of Utah, as to water system, whith reads as follows: Every owner, agent, manager, or lessee of mines within the State of Utah, shall provide and maintain a water system for the purpose of conducting water to the face of each and every working place, and throughout the entire open part of the mine, in sufficient quantities for sprinkling purposes to wet down the dust that shall arise and accumulate in and around the mine, provided that in mines or parts of mines where by reason of the natural wet condition, or the moisture derived from the introduction of steam into the air current, or both, such sprinkling may not be necessary. And it shall be the duty of the superintendent, mine-foreman and inspector to see to it that this is done.

I will also refer to sec. 16 which calls for your mine foreman to hold a certificate of competency which is required by law. I spoke to your mine foreman about the same and told him what to do, if you think he is the man you want to be inside foreman. I will also ask you to see your mine foreman and have him search the men for matches before going on shift, as they must not be allowed to carry matches in the mine.

The man who dumps the Gilsonite in the bin and the car should not be allowed to smoke while on duty. I was told that the man that did the dumping smoked several times during the day while on duty. It must be stopped, as there should be no fire within 200 feet of the dump, as you know that when a car of gilsonite is dumped into the bin it makes lots of dust, if you should have an explosion at the dump the smoke would

go into the mine and the men would have but little chance for their lives.

Do not think I am pushing you, as this is for your interest as well as the working men. Hoping you will see to this at once,

Yours truly,

GOMER THOMAS,

State Coal Mine Inspector.

FATAL ACCIDENTS IN HYDRO CARBON MINES DURING  
1906.

April 18th. On this date, Otto Anesi, Silverton, Colo., Elmer Hopkins, Kanosh, Utah, single, W. H. Forman, Bluff, Utah, single, and B. L. Raorden, Winter Quarters, Utah, married, leaving a wife and five children.

The said men came to their death on April 18th, 1906, while employed in the Pariette Mine, and that the death of said men was caused by burning gas.

FINDINGS OF INQUEST JURY.

YATON, UTAH.

State of Utah,  
Duchesne Precinct.  
Wasatch County.

An inquest having been held at Pariette, 1906, before H. G. Clark, justice of the peace in Duchesne Precinct in said county, upon the bodies of Elmer Hopkins, Otto Anesi, W. H. Forman and B. L. Raorden there lying dead, by the jurors whose names are herewith subscribed, the said jurors upon their oaths do say—

That said men came to their death on April 18th 1906, while employed in the Pariette Mine and that the death of said men was caused by burning gas.

And we jury further find that the mine has been closed for the past twelve hours with no pumps running making it exceedingly dangerous to enter the mine at this time thereby preventing the jury making the personal investigation desired.

In witness whereof the jury have hereunto set their hands this nineteenth Day of April, One Thousand Nine Hundred and Six.

(Signed)

W. M. GENTRY,  
D. T. POWELL,  
E. M. JONES,  
Jurors.

H. G. CLARK,  
Justice of the Peace.

#### FATAL ACCIDENTS FOR THE COAL MINES DURING 1906.

June 9th, 1906. On this date, M. Imanaka, a Japanese, age 29 years, was fatally injured in Castle Gate Mine. Skull fractured at the base of brain, neck dislocated, scratched and bruised in various places over the body and limbs. He was apparently engaged undermining the coal at the face of his room when a large triangular piece of rock fell from the roof, knocking him down and doing him the above stated injury, and killing him instantly.

The coroner's jury returned the following verdict:—This Jury finds that this man come to his death by rock falling from the roof in the mine; cause of accident his own neglect.

(Signed.)

JOHN PERRY,  
J. E. BATCHELOR,  
GRIFF THOMAS.

October 22nd, 1906. On this date, Aurable Pasquale, age 30, Italian, miner, was instantly killed in No. 2 Mine Sunnyside. Pasquale was single and had been in the employ of the Company five years.

While he was loading a car at face of his working place, a stump on 6th left off 5th raise and in the act of lifting a shovel of coal, a wedge shaped piece of rock weighing something like a ton fell from roof, striking him on the head and killing him instantly.

November 14th, 1906. On this date, Antone Bende, age 39, a miner, was fatally injured in the Castle Gate Mine. Antone Bende was married and had been in the employ of the company three years. Injuries:—Skull

fractured right temple, scalp wound on top of head about five inches long, also various bruises on body and limbs.

Room had been driven up to limit and cross cutted through to next room, and were on their second skip, being about half way over when accident occurred. The place was examined on the morning of the accident and reported safe by the Fire Boss. The Mine Foreman was in this place the morning previous and found the place well timbered and safe. The driver, who was his partner and had been called out to drive, had brought 2 cars into the room about 1:10 p. o'clock, and Bende and his other partner immediately started to load, being between cars and face after about five minutes loading Bende called to his partner "Look out it (meaning the roof) is coming" his partner ran out at once and got away about 100 feet when the roof caved. Bende must have paused to listen as he was found only 10 feet from where he was loading.

#### COPY OF INQUEST.

*State of Utah, Castle Gate Precinet, County of Carbon.*

An inquest having been held this day of November 14th, 1906, on the body of Antonio Bende before Justice of the Peace Frank G. Stafford of Castle Gate Precinct of the aforesaid county. We the Jurors find after making diligent inquires and hearing all testimony that the said Antonio Bende came to his death by a sudden cave in of rock and coal.

We the Jurors with the evidence and testimony before us return a verdict of accidental death.

Jurors,

WM. FEATHERSTONE,  
ED. EDWARDS,  
J. E. BATCHELOR.

#### NON-FATAL AND SERIOUS ACCIDENTS FOR 1906.

March 14th, 1906. On this date, James O. Clark, a Tracklayer, was injured in the Wasatch Mine, at



Coalville, Utah. At time of accident Clark was back a car on the siding. Right leg above ankle joint squeezed between bumpers of two cars causing lab bruises of flesh and fracture of small bone.

July 14th, 1906. On this date, Fred Roberts, a miner, was injured in the Clear Creek Mine. Bruised lower part of body. He was loading a car and stepped behind the props to get some chunks of coal, as he did so a piece of rock fell on his body.

July 14th, 1906. On this date, J. L. Roper, a driver, was injured in the Castle Gate Mine. Injury to spine causing loss of sensation from waist down, also a gash on knee. Roper was taking in two cars along the 8th Level of the 9th Rise when the pin of the holdback chains came out allowing one side of the shaft to drop, scaring the mule which started to run. Roper evidently got excited and jumped off the cars at the mouth of the 8th Room onto a pile of props which he had put there earlier in the day. He rolled back against the cars and got hit in the back with one of the cars.

July 30th, 1906. On this date, F. R. Lundy, a driver, was injured in the Castle Gate Mine. At time of accident Lundy was coming down No. 6 room and ran into two other cars with his trip causing injuries to back and breast.

August 3rd, 1906. On this date, D. O. Barnes, a miner, was injured in the Sunnyside Mine No. 1. Big toe of left foot crushed. He was standing on a piece of coal by side of track and foot slipped off on track and car ran over big toe.

August 3rd, 1906. On this date, Thomas Wilson, a miner, was injured in the Winter Quarters Mine by a small piece of slate falling from the roof and striking him on the head, causing slight scalp wound.

July 25th, 1906. On this date, Thomas Phelps, a rope rider at No. 1, Bridge at Sunnyside, was injured. Index finger on left hand cut by rope. Rope worn and a piece of wire was sticking through rope, and while pulling rope down to couple on empties, he got his finger caught on the wire, causing slight cut.

July 26th, 1906. On this date, Rudolph Cramer, a miner in Sunnyside Mine No. 3, was injured. Slight injury to left leg just above ankle, account being struck with pick while mining.

July 30th, 1906. On this date, Joe Molinaro, a laborer at Sunnyside, was injured at the crusher. Left wrist bruised. While cleaning up slack a piece of pipe got caught in elevator and mashed his arm against elevator.

July 30th, 1906. On this date, Nick Knoff, a miner, was injured in No. 2 Mine at Sunnyside. Right knee bruised. Stumped his toe on a piece of coal, and struck his knee on a rail.

August 3rd, 1906. On this date, James Dale, a trapper, was injured in No. 1 Mine at Sunnyside. Dale was walking along entry when he stumbled and fell to the ground, striking his hand on a board from which there was a nail projecting that caught his hand.

August 4th, 1906. On this date, Cosino Yapelli, a miner, was injured in No. 1 Mine Sunnyside. Slight injury to eye, piece of coal got in left eye.

August 6th, 1906. On this date, Ed. Twiss, a driver, was injured at Sunnyside. Car jumped the track bruising his left leg.

September 28th, 1906. On this date Anthony Screener, a driver, was injured in the Sunnyside Mine No. 2, collar bone broken on right shoulder. Car jumped track and caught him between car and props.

September 29th, 1906. On this date Tony Tartoghi, a driver, was injured in the Sunnyside Mine No. 1, collar bone on left side broken. Car run off track at switch and caught him between car and coal.

#### NON-SERIOUS ACCIDENTS FOR 1906.

June 25, 1906. On this date George Callas, a motorman on a larry car at Castle Gate Coke Ovens. Callas was taking a loaded car of slack to dump in a coke oven when he claimed that the power went off and he was unable to hold his car which ran off the end

of the ovens. Callas sprained his ankle, which was caused by his jumping from the top of the ovens.

June 28th, 1906. On this date Steve Gekovich, a driver in the Sunnyside Mine No. 1, was injured. While coming over parting, pin pulled out and let gun down on foot, causing slight injury.

June 30th, 1906. On this date, Mike Rice, a miner in the Sunnyside mine No. 1, was injured, right arm bruised. Car too full, and while trying to push coal up on car mule started and caught injured between coal on car and roof.

July 8th, 1906. On this date Oscar Robertson, a miner, was injured in Sunnyside mine No. 1, right foot bruised. A chunk of coal fell from face of coal and rolled on foot, causing slight bruise.

July 19th, 1906. On this date Sam Preston, a driver, was injured in the Sunnyside mine No. 1, right elbow bruised. While riding mule to mine a woman came out of a house and was haking a rug, and scared the mule which threw driver off and hurt his right elbow.

August 9th, 1906. On this date Edward Neilson, a driver, at Winter Quarters Mine, was injured. Entire end of ring finger from second joint smashed. At place of accident the track is quite steep, and to make the car secure that it could not run away the miners used a piece of rock about four feet long as a brace, placed in front of the car and against a tie in the track. Neilson in removing this rock after he had hitched his horse to the car, got hold of the next to the car and the horse started up before the rock was out of the way and caught his finger between the car and the rock.

# Notes on the Weber River Coal Field, Utah.

BY JOSEPH A. TAFF.

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## PRELIMINARY STATEMENT.

For many years coal has been worked with varying profit at a number of localities in Weber River valley and its tributaries, Chalk and Grass creeks, in the vicinity of Coalville, Summit County, Utah. Summit County is in northern Utah, and adjoins southwestern Wyoming.

The Weber River coal field is situated east of the Wasatch Mountain range. The river collects its waters chiefly from the northwestern slopes of the Uintah range, flows northward across Summit County, and thence westward through the Wasatch range to Great Salt Lake west of Ogden.

Facilities of transportation for the coal of the Weber field are afforded by the Union Pacific railroad. The main line of this road follows the valley of Weber river from Ogden to Echo, where it turns toward the north-east up Echo canyon. From Echo, the Park City branch of the Union Pacific continues up the Weber valley through Coalville. From the Park City branch spurs have been constructed to the Wasatch and Grass Valey mines, 2 and 7 miles respectively, northeast of Coalville. The Dexter mine, the only other one now in operation, is situated one mile southeast of Coalville.

The rocks at Coalville were examined and the occurrence of coal noted by F. B. Meek and E. Engelmann in 1859 while attached to the exploring party in command of Captain J. S. Simpson, U. S. army. Meek revisited the field in 1872, and it was later studied by

members of the Fortieth Parallel Survey; also by C. A. White in 1877. Beginning with the Meek and Englemann report in 1860, the rocks were classed in various groups of the Cretaceous. T. W. Stanton has surveyed the Coalville section, besides various others in the western Cretaceous areas. In a comparative study of the Colorado group of the Cretaceous, the coal-bearing rocks of the Weber River valley are included by Stanton in the lower or Benton division of the Colorado group.

The Weber River coal strata are of the same age as a part of those of the Kemmerer field in southwestern Wyoming, recently surveyed by A. C. Veatch. The exact stratigraphic correlation of the coal beds in the two fields, however, has not been determined.

#### SURFACE FEATURES.

The larger physiographic features of the country in the region of Coalville are not dependent for their expression on the lithologic character of the formations. The main valleys and ridges cut indiscriminately across the hard and soft rocks. Weber river has a course west of north and Chalk creek runs nearly west, while the strike of the rocks is generally northeast and southwest. Within a range of six miles from Coalville the surface rises 3,500 feet toward the southwest. Toward the east and northwest it rises to elevations of 2,000 and 2,500 feet above the valley of Weber river, which is here 5,600 feet above the sea.

The thicker and harder sandstones of the coal-bearing sections, Nos. 1, 4 and 6, given below, and another referred to near the top of the Cretaceous system in this field, make distinctive ridges and benches in the lower slopes of the valleys of Weber river and Chalk and Grass creeks. The dip of the rocks is towards the northwest and the outcropping edges of these sandstones make precipitous southeastward-facing cliffs. The lowest sandstone, No. 1, of the section, is less prominent in its topographic effects than the others, yet is a distinct marker for the position of the most valuable coal bed in the field, which lies immediately beneath it.

## STRATIGRAPHY.

The rock formations consist of shale, sandstone, and conglomerate, with occasional strata of limestone and three or more beds of coal. The numerous faults that intersect the rocks and the spaces of concealed strata in the valleys prevent the measurement of an accurate section in the vicinity of Coalville except by a detailed survey and a careful study of the fossils. Little note was taken of the rocks below the lowest known workable coal now being developed at the Wasatch mine, two miles northeast of Coalville. Stanton who has studied the section at Coalville, reports that below this coal are 500 to 600 feet of interstratified shale and sandstone. The following general estimated section, based in part on Stanton's measurements, in ascending order, will give some idea of the lithologic succession and positions of the coal beds.

## GENERAL SECTION OF COAL-BEARING ROCKS IN WEBER RIVER FIELD:

	Feet.
1. Wasatch coal, being mined at Wasatch and Grass Valley mines.....	9- 14
2. Sandstone, thick-bedded, light gray .....	40
This sandstone is the roof of coal in Wasatch and Grass Valley mines.	
3. Blue-clay marl (Grass Valley).....	400-765
Crops in valleys chiefly and is usually only partially exposed. Coal occurs in the upper part or probably at the top of this shale. It is reported by Mr. Samuel Clark, superintendent of the Wasatch mine, to be a double seam, each bench being 3 to 4 feet and separated by 2 to 3 feet of shale. The upper coal is succeeded by sandstone.	
4. Sandstone and conglomerate.....	100-300
In Grass valley it appears thicker than at Coalville, and is separated into two members by shaly strata.	
5. Shale and thin sandstone... ..	400-500

A bed of shell limestone occurs in upper part and a thin bed of coal is reported to occur near the same position in the section. A coal in the upper part of this group of strata, one emined two miles southwest of Coalville, is reported by Mr. T. J. Lewis, manager of the Wasatch mine, to consist of two beds, each 2 to 3 feet thick, separated by shale varying in thickness from  $1\frac{1}{2}$  to 2 feet.

6. Massive light yellow sandstone and conglomerate ..... 100-300

Above these sandstones and conglomerates there is shale, probably 1,500 feet thick, which is in turn followed by brown and gray sandstone, with minor shale beds 1,300 to 1,500 feet thick, to the base of the great Wasatch conglomerate of presumably Tertiary age.

#### STRUCTURE.

The coal-bearing rocks in the vicinity of Coalville on the north and west are tilted toward the northwest at angles varying generally between  $16^\circ$  and  $20^\circ$ . The rocks also have been broken and disturbed by two systems of faults. One is a system of strike faults bearing northeast and southwest, almost with the strike of the rocks; the other is a system of dip faults at right angles to the first. A fault belonging to the first-mentioned system may be seen northeast of Coalville. It extends from the northern boundary of the city northeastward across the SE.  $\frac{1}{4}$  sec. 4 and the NW.  $\frac{1}{4}$  sec. 3, T. 2 N., R. 5 E. The abandoned coal mine in the SE.  $\frac{1}{4}$  sec. 4 is located near this fault. The rocks on the southeast side of the fault have been dropped with respect to those on the opposite side. The massive sandstone in the ridge lying across sec. 3 above and northwest of the Wasatch mine has been thrown down until it appears to extend 800 feet beneath its counterpart in the prominent ridge one-half mile to the northwest, extending across sec. 4. A dip fault cuts the rocks crossing near the southwest corner of

sec. 3. Another fault of this system occurs nearly 3,000 feet northeast of the Wasatch mine. It crosses the township line near the center of the north side of sec. 3, T. 2 N., R. 5. E. This fault has limited operations in the Wasatch mine toward the north. Minor faulting and belts of fractured strata are found frequently in the mines.

In Dexter Hollow and at the Dexter mine, 1 mile southeast of Coalville, the rocks dip 16° SE. Between Dexter Hollow and Spring Canyon, 1 and 2 miles respectively south-southeast of Coalville, the dips are eastward. As Spring Canyon is ascended eastward 2 miles from Weber River valley, the rocks are seen to dip successively northward and then northwestward. These observations indicate that a basin-like fold bears eastward from Weber River valley in the central part of T. 2 N., R. 5 E. Between this fold and the northwesterly dipping rocks at Coalville, the structure is anticlinal and the rocks are probably faulted. Exposures of the rocks are insufficient, however, to reveal the character of the structure.

#### COAL.

There are certainly three and probably four coal beds mined or prospected in the region of Coalville. These coals will be considered in the order of stratigraphic succession and as it happens, at the same time in the order of economic importance.

*Wasatch coal.*—The first of these coals may be called the Wasatch coal, from the Wasatch mine, now in operation two miles northeast of Coalville. The coal here has been removed from an area of 4,000 feet on the strike by 750 feet in the direction of the dip. The coal is massive and varies in thickness between 9 and 14 feet. A sandstone bed 40 feet thick forms the roof. The floor is a dense clay, and is underlain by a bed of bony coal, the thickness of which has not been determined. The coal mines in block, is moderately hard and appears to be a fair grade of the bituminous variety. In the proximity of faults and zones of shearing that are of common occurrence the coal has suffered considerable crushing. In such places it is



rendered weak and considerable slack and soft coal is produced.

The same coal is mined on Grass Creek 7 miles northeast of Coalville in sec. 18, T. 3 N., R. 6 E. The Grass Creek coal is the same bed as that of the Wasatch mine. Massive sandstone 40 feet deep overlies it. The coal is usually 8 feet thick, but swells locally to 12 feet. In this mine, as in the Wasatch, the coal is much jointed and broken by faults. Water enters the mine freely through the joints and fault fissures, requiring constant pumping. Because of excessive water the pillars are being drawn in the mine preparatory to moving operations one-fourth mile to the southwest.

The outcrop of the same coal follows Grass Creek, and has been mined at a number of localities down the valley, from section 18 T. 3 N., R. 6 E., to section 27 T. 3 N., R. 5 E., where it is interrupted by a dip fault which displaces the outcrop of the coal toward the southeast. The coal has been mined at seven or more different places along Grass Valley within a distance of 4 miles below the Grass Valley mine, but all have been abandoned. The Union Pacific Railroad was the chief operator, but it is reported to have abandoned the work here in favor of better property in the Wyoming field. The Wasatch coal was mined also in the town of Coalville and for a time a mile northwest of town near the strike fault, but these operations have been abandoned.

*Dexter coal.*—A coal bed is being developed by the Dexter Brothers, one mile southeast of Coalville, in the SE  $\frac{1}{4}$  sec. 16, T. 2 N., R. 5 E. It is presumed by some that this bed is the same as the Wasatch coal, but the identity of the two beds is not proved by surface indications. The section at the Dexter mine seems to be as follows:

## SECTION OF DEXTER MINE ONE MILE SOUTHEAST OF COALVILLE, UTAH.

	Feet.
Sandstone, full thickness not determined	
Shales, roof of coal, reported to contain fossil shells	4
Coal, upper bed.....	7
Shale.....	4
Coal, lower bed.....	7
Clay shale.....	4

The upper bench of coal is the only one now worked. The section below this bench is reported by Dexter Brothers to have been proved by excavations beneath the present workings. The coal in the Dexter mine is clear of shaly impurities or tangible sulphur compounds, and the quality appears to be equal to that of the Wasatch coal. The Dexter coal has been mined to a small extent in several places in the hollow below the Dexter mine. The irregularities in the position of the outcrops, as indicated by the abandoned mines and the difficulties said to have been encountered in mining shows that the strata have suffered considerable displacement by faulting.

*Other coals.*—A double coal bed occurs nearly 400 feet above the Wasatch coal, but is, at the present time of little economic importance. The coal in each of the two benches is reliably reported to have been mined a mile north of Coalville. Each bench is 3 to 4 feet thick, separated by a shale bed two to three feet thick. A coal in the stratigraphic position of this bed has been prospected in the north slopes of Grass Creek Valley near the south side of sec. 3, T. 3 N., R. 5 E. A similar double seam of coal occurs stratigraphically about 700 feet higher and 1,100 to 1,200 feet above the Wasatch coal. In the early development of the country this coal was mined 2 miles west of Coalville, in sec. 19, T. 2 N., R. 5 E. It is reliably reported that each of the beds is  $1\frac{1}{2}$  to 3 feet thick and separated by  $2\frac{1}{2}$  to 2 feet of shale. A coal in the same stratigraphic position was mined also at one time in the NW  $\frac{1}{4}$  section 4, T. 2 N., R. 5 E.

*Qualities of coal.*—The Wasatch, Grass Valley, and Dexter mines now in operation in the vicinity of Coal-

ville yield a product that has the physical properties of a fair grade bituminous coal. It is a black block coal of medium hardness. A sample of the Wasatch coal was analyzed by Mr. F. M. Stanton, chemist, U. S. Geological Survey coal-testing plant, St. Louis, Mo. An analysis of the coal at Winterquarters, one of the most extensive mines in the Book Cliffs coal field, was made also. The Book Cliffs field is one of the most extensive in the State, and the coal has been successfully used both for steaming and domestic purposes and the production of coke.

COMPARATIVE ANALYSES OF COAL FROM COALVILLE AND WINTERQUARTERS.

	Coal-ville.	Winter-quarters.
Moisture .....	13.92	8.10
Volatile matter.....	37.96	40.21
Fixed Carbon.....	43.67	45.91
Ash .....	4.45	5.78
Sulphur.....	1.03	.86
	101.03	100.86

The per centage of water in the Coalville coal approaches that often found in the black lignites, the highest grade of so-called lignites. Owing to the abundant mine water occurring in the mines near Coalville and the shattered character of much of the coal, it is possible that a small amount of superficial water was carried in the sample at the time the analysis was made. The physical characteristics, its behavior on exposure in the atmosphere, and its utilization show it to be a bituminous coal well adapted to domestic uses.

*Conclusion.*—The coals of the Weber River field, other than the Wasatch and Dexter beds, are of little immediate economic value. The interstratified shales, together with the difficulties experienced in mining incident to water and broken strata, have prevented these other beds from competing with the Wasatch and Dexter coals. The Wasatch and Dexter beds are ample in thickness for successful working, and the quality of

the product compares favorably with the better grades of bituminous coals of the Rocky Mountain region. The difficulties in the way of large exploitation of these coals are the amount of mine water and the fractured nature of the beds, resulting in the production of considerable quantities of slack.

# Book Cliffs Coal Field, Utah, West of Green River.

BY JOSEPH A. TAFF.

## LOCATION AND EXTENT.

The Book Cliffs coal field is in central and eastern Utah. Its south end lies in eastern Sevier County, near the center of the State. From this locality the field bears north-northeast to Price River near Castle Gate, in western Carbon County. From Price River it curves to the east for 20 miles and then bears to the southeast, crossing Green River north of the Rio Grande Western Railway. Beyond Green River it turns to the east and northeast, passing into Grand County and thence into Colorado. Only that part of the field limited to Sevier, northwestern Emery, and Carbon counties has been surveyed and hence is included in this report.

The Book Cliffs coal field is relatively narrow, comprising the eastern escarpment of the Wasatch Plateau through Sevier, Emery, and western Carbon counties and the southern face of the Book Cliffs from Castle Gate eastward to the Colorado line (see Pl. IX). The lateral extent of the field is governed by the length and depth of the canyons that have been cut into these escarpments. A local variation in width may be noted in a north-south swell of the strata situated near the eastern rim of the Wasatch Plateau in extreme western Carbon and northwestern Emery counties. The mining towns of Clear Creek and Winter Quarters are on the northward pitch of this swell. The erosion of Pleasant Valley and the upper part of Huntington Creek Valley have exposed the coals in this uplift. With the exception of Pleasant Valley the canyons cutting the coal-bearing rocks descend from the plateau out through the faces of the escarpments into the rolling plain of Castle Valley.

The coal-bearing strata descend gradually inward beneath the plateaus from the middle slopes of the front cliffs and pass beneath the drainage line of the canyons and gulches, as a rule within a few miles of the front. Exceptions may be noted in the case of Price River, Huntington Creek, and Gordon, Cottonwood, Ferron, and Muddy Creek canyons, where the coal outcrops extend from 6 to 20 miles into the plateaus. In such instances the field of available coal is considerably increased.

#### SURFACE FEATURES.

The region of the Book Cliffs coal field is an open country, and from an eminence near the junction of the Wasatch escarpment and Book Cliffs north of Price the observer may comprehend the general physical features of the whole land at a single sweeping view. The desert plain of Castle Valley stretches away to the limit of vision toward the southwest and southeast. Between the arms of the valley toward the south the broad, rugged surface of the San Rafael Swell rises in the distance. Along the borders of Castle Valley on the north and west terraced cliffs rise to heights of 1,500 to 2,000 feet. These form the escarpments of the Book Cliffs and the Wasatch Plateau. Between Castle Gate and Sunnyside the Book Cliffs Plateau slopes gradually to the north, in agreement with the dip of the rocks to the base of the Roan Cliffs.

Long, tongue-like, flat table-lands and mesas 100 to 200 feet high, capped by the thick sheet of bowlder wash, the remnants of the old valley floor, extend from the bases of the Book Cliffs and Wasatch escarpments out into Castle Valley. At the borders of these table-lands and mesas are fantastically carved terraces and columns. The floor of Castle Valley and of the lower slopes of the escarpments at its borders is a friable blue clay marl. The larger streams that flow from the plateaus have worn through the bowlder layer forming flat box valleys in the soft clay marl. The smaller drainage channels on cutting through the bowlder and gravel surface sink into the marl, producing an ex-

tremely rough, boulder-strewn, badlands type of topography. Before this erosion occurred the old valley floor stood high above its present level and was covered with a thick mantle of boulders and gravel, which was spread over the plain for several miles from the escarpments.

Beds of sandstone that are locally variable in thickness occur in the shale of Castle Valley 500 to 700 feet below the top of the formation. At the base of the Book Cliffs they are thin and shaly and have little effect on the topography. From Price River westward they increase in thickness rapidly, aggregating more than 100 feet on Gordon Creek. Toward the south they thin to mere bands on reaching Huntington Valley, but still farther south they become thicker, reaching 200 to 250 feet on Muddy and Ivie creeks at the south end of the coal field. These sandstones, occurring as they do in the midst of soft shales, make peculiar and striking features in the topography, and from them Castle Valley has acquired its name. Box canyons, many of them impassable, fluted and terraced cliffs, castellated headlands, and perpendicular towers mark their occurrence. Even where the sandstone is thin it serves as a protecting cap to the buttes, and in many places the underlying clay marl stands in perpendicular columnar walls 100 feet or more in height. The soft layers in the marl weather out in parallel bands in the cliffs, leaving the hard layers as projecting ledges. Thus the cliffs simulate rows of gigantic books.

There is a gradual rise of the surface from Castle Valley toward the San Rafael Swell. The rocks beneath the Castle Valley marl consist of pinkish sandstone several hundred feet thick. This sandstone makes the Red Plateau and the western rim of the Swell. In turn, it is underlain by friable arenaceous shale. On cutting through this sandstone the streams have descended rapidly in the soft underlying marl, creating a strikingly rugged and almost impassable country, which extends diagonally across Emery County from the Red Plateau toward the southwest. The main escarpment produced by these sandstones faces east and south toward the center of the Swell. Nu-

merous channels draining into San Rafael River and Muddy Creek have cut by headwater sapping into this escarpment, reproducing in a measure the topography of the Book Cliffs and the Wasatch Plateau escarpments, with even more picturesque effect. Perpendicular cliffs mark the escarpment faces and deep box canyons extend back into the plateau. On the divides and projecting points between the drainage lines near the escarpments there are high pinnacles and rugged towers of pinkish sandstone.

#### STRATIGRAPHY.

The survey of the Book Cliffs field during the past season has special reference only to the occurrence of coal. Such work as could be devoted to formations contiguous to the coal-bearing rocks was in the nature of a reconnoissance.

The rocks are naturally arranged in thick groups of strata. In each group either sandstone or shale greatly predominates. They contain scant fossil remains, and sufficient information regarding their age has not been obtained to correlate them with similar well-known beds in other parts of the country. The entire section is without doubt cretaceous, and the principal coal-bearing strata are within the Laramie formation. Further study of the section and detailed areal mapping will doubtless show that the principal groups of strata may be subdivided into smaller units of more uniform lithologic character. For these reasons the formation will not be named, being described by reference to their occurrence.

*Shale of the San Rafael Swell.*—The lowest formation was noted in a reconnoissance down Muddy Creek southeast of Emery. Only the upper 250 or 300 feet of the formation was seen. It consists of bluish argillaceous shale. From the cliffs of overlying sandstone it could be seen that deposits of the same character make the desert 12 to 15 miles out on the western slopes of San Rafael Swell.

*Sandstone of the Red Plateau.*—Reddish, yellow, and brown sandstone overlies the blue shale of the San Rafael Swell. On Muddy Creek southeast of Emery,



where the section was measured, the formation consists of sandstone, shale, and coal, in the following order, from the top down:

## SECTION ON MUDDY CREEK.

	Ft.	in.
Base of Castle Valley shale.		
1. Brownish and yellow sandstone, with some shale interstratified.....	25	
2. Thin seam of coal.		
3. Shaly sandstone.....	10	
4. Shale .....	5	
5. Coal.....	5	
6. Shale and thin coal.....	1	6
	to	2
7. Yellow, brown, and pinkish sandstone ..	125	
8. Bony coal, separated into two nearly equal benches by variable bands of bony shale 4 to 14 inches in thickness ..	4	9
	to	7
	2	
9. Yellowish sandstone ..	15	
10. Bituminous shale and coal, the coal occurring in two bands of nearly equal thickness ..	3	
11. Yellow, somewhat friable sandstone, with thin carbonaceous shale in the central part.....	225	

This sandstone formation makes the bold, rugged escarpment and the Red Plateau, bounding the San Rafael Swell on the northwest side and the north end, respectively. The escarpment grows higher and more rugged northward from Muddy Creek, and for this reason it is believed that the formation becomes thicker in the same direction. The coal, which is of little economic importance, is known to occur only to the east and southeast of Emery.

*Shale of Castle Valley.*—A blue-clay shale or marl 1,000 to 1,500 feet thick overlies the sandstone of the Red Plateau. Castle Valley is eroded in this shale, and the sandstone lentils in the upper part produce the characteristic topographic features from which the valley derived its name. The lower half of the formation lies in a gently undulating desert plain, and the

rocks usually are not exposed. In the coal investigation there was no occasion to examine the lower part of the formation. The upper part, except the sandstone lentils, is an even-textured blue marl that is highly impregnated with alkaline salts. Even on rapidly weathering surfaces the white salts exude in many places. In poorly drained irrigated districts, where the soil is thin, alkaline salts are so abundant as to destroy vegetation. The sandstone lentils that occur 500 to 700 feet below the top are made up of beds of varying purity and thickness. From the vicinity of Sunnyside westward to Price River they are represented by thin shaly sandstone that is scarcely perceptible, having very slight effect on the topography. Westward from Price River the beds increase in thickness, aggregating more than 100 feet in the valley of Gordon Creek. Toward the south the beds thin out to mere bands in a distance of 13 miles. Southward from Huntington they increase again, reaching nearly 200 feet on Quitcupah and Ivie creeks, at the south end of the coal field. The sandstones comprising the lentils include many shaly sandstone and shale beds.

The Castle Valley shale was examined by T. W. Stanton in a brief reconnaissance trip near the Rio Grande Western Railway about 50 miles southeast of Castle Gate. The collections of fossils that he was able to make showed that the upper part of the Castle Vally shale belongs to the Montana group of the Cretaceous and that the parting between this group and the succeeding Laramie coincides approximately with the boundary between this shale and the overlying sandstone of the Book Cliffs.

*Laramie Formation.*—The Laramie formation consists of sandstone, shale, and coal in alternate succession. The sandstones occur in beds ranging from a few feet to nearly 500 feet in thickness. For convenience of description the Laramie formation may be separated into three parts—(1) that below the coal, consisting of sandstone and shale in almost equal proportions; (2) coal-bearing series of sandstone, shale, and coal alternately stratified; (3) upper beds, consisting almost entirely of sandstone.

1. The rocks below the coal consist of two thick

yellowish to drab and light-gray sandstones separated by a mass of shale and thin sandstone. The lower sandstone varies in composition as well as thickness.

In the Wasatch Plateau it is 80 feet or more thick and generally a massive magnesian sandstone. In the Book Cliffs it is thinner and more shaly. It is always present, however, and is exposed in steep bluffs and often impassable cliffs. This bed invariably overlies the marly shale formation of Castle Valley. Above the lower sandstone is a series of shale and sandstone beds. The sandstone rarely reaches a thickness of 20 feet, and the whole aggregates 60 to 100 feet. These beds are often talus covered. Where exposed they make rather steep terraced slopes, and the sandstone ledges project in benches or low bluffs. Beneath the lowest productive coal bed in the Book Cliffs field there is a continuous sandstone 80 to 100 feet thick. It is light yellow or drab in color except the upper 10 to 20 feet, which is usually white. In the eastern and southern slopes of the Book Cliffs and Wasatch escarpments the sandstone stands out in steep bluffs and often impassable cliffs. In the northern and western slopes of the canyons entering the escarpments it is often broken down, but is rarely concealed by talus. This sandstone bed is a most valuable guide in searching for coal in this region, as it occurs just below the lowest workable coal in the Book Cliffs field. It can not only be traced readily from point to point of the cliffs, but can be recognized at a range of several miles by its characteristic features and position.

2. The coal-bearing rocks consist of nearly equal portions of sandstone and shale, with several beds of coal. With the exception of some heavy beds in the lower part, the series consists of relatively thin strata that are usually more or less concealed by talus. The lowest coal bed where it has been seen fully exposed in mines and prospects varies between 3 and 20 feet in thickness. It rests often directly upon the massive sandstone at the top of the series below the coal. In the localities of its thinner occurrence blue to black shales, usually containing thin coals, occur above it. Where the coal bed is thickest it commonly has a sandstone roof.

Pinkish to yellow sandstone, associated with shale,

overlies the lowest coal. These deposits, 30 to 50 feet thick, usually make steep slopes between cliffs of sandstone in the escarpments and canyons that face toward the south and east. In sec. 16, T. 13 S., R. 10 E., north of Price, they are succeeded by a second coal bed 8 feet 6 inches thick.

A massive sandstone overlies this second coal bed. It is yellow to pink in color, except the upper 15 to 20 feet, which is almost white. This sandstone, like that underlying the lowest coal, extends throughout the Book Cliffs field. Its thickness is rarely below 50 feet and sometimes approaches nearly 100 feet.

A third coal horizon occurs immediately above this sandstone in sec. 16, T. 13 S., R. 10 E., where the rocks are naturally displayed for inspection. Fifteen feet of coal were exposed. In Coal Canyon, in T. 13 S., R. 11 E., a coal in this position is 8 feet thick. A coal having approximately the same stratigraphic position in Huntington Canyon, in sec. 24, T. 16 S., R. 7 E., is 8 feet thick. Above this third coal horizon there is a uniform succession of sandstone, shale, and coal, upward for 600 to 800 feet to the top of what is now recognized as the coal-bearing series. It is not usual that the individual sandstone beds exceed 10 feet in thickness. Shales and sandy shales are usually concealed by talus. It is estimated that the aggregate thickness of the shaly beds is nearly equal to that of the sandstones. Several coal beds, some of workable thickness, occur in this series of sandstones and shales. In the Book Cliffs north of Price, between Bull and Helper canyons, one bed occurs 50 feet and another 150 feet above the third coal horizon. In Coal Canyon six coal beds have been exposed in a section of rock 360 feet thick. The uppermost one, 4 feet 11 inches thick and of excellent quality, appears to be above the third coal horizon. In Huntington Canyon and in other places in the Wasatch Plateau coals of workable thickness are known to occur in the upper part of the coal-bearing series, but little attention has been paid to them where coals 4 to 20 feet thick occur lower in the section and are more accessible.

3. The coal-bearing series of shale, sandstone, and coal is succeeded by a formation of light-yellow sandstone that continues upward to the base of the Tertiary

deposits in the crest of the Book Cliffs Plateau. Thin coal seams have been seen at a few places in the lower part of this section and some shale is interbedded with the sandstone in the upper part. The central 500 to 700 feet of this sandstone series make bold cliffs toward the top of the Book Cliffs and Wasatch escarpments. In the Book Bluffs the sandstone is estimated to be not less than 1,000 feet thick. Toward the west it either becomes thinner or is in part concealed by the overlap of Tertiary strata.

#### STRUCTURE.

That part of the Book Cliffs coal field west of Green River lies on the outer rim, to the north and west, of the broad upward fold known as the San Rafael Swell. The Book Cliffs are on the northward pitching end of this fold and the rocks dip about 5 degrees. Near the junction of the Book Cliffs and the eastern escarpment of the Wasatch Plateau, at the west side of Price River Valley, the strike of the rocks turns toward the south. Throughout the eastern escarpment of the Wasatch Plateau, from Price River to the south end of the field in eastern Sevier County, the rocks are almost flat. The dips are usually toward the west and rarely exceed 2 degrees.

*Folds.*—Huntington Canyon and Pleasant Valley cut deeply into the northeastern part of the Wasatch Plateau, exposing the coals and revealing a slight upward flexure of the rocks. The strata have been broadly though slightly warped. The center of this swell is situated near the source of Huntington Canyon and Pleasant Valley, in western Carbon and northwestern Emery counties. The swell is so low that the westward inclination of the strata due to the San Rafael uplift is succeeded by a horizontal position or one slightly inclined toward the east. The rocks are inclined at a lower grade southward down Huntington Canyon. The dips of the rocks, however, are less than the grade of the stream. The inclination of the strata is very low also toward the west. The dip is very slight toward the north from the head of Pleasant Valley to Scofield. From Scofield north-

eastward, however, the inclination gradually increases to about 5 degrees in the vicinity of Colton.

*Faults.*—A series of parallel normal faults, trending in a north-south direction, were noted toward the head of Pleasant Valley; also in Huntington Canyon in the eastern part of T. 16 S., R. 7 E. The fault planes are nearly vertical and the throws or displacements vary from a few feet to nearly 100 feet. Coal prospectors report that greater faults occur on the west side of Pleasant Valley above Winter Quarters, but the report was not verified. A few faults of local extent bearing east and west were noted in the Winter Quarters mine, and associated with them are parallel thin igneous dikes that locally coke the coal. Another group of normal faults bearing north and south cut the escarpment of the Wasatch Plateau west of Ferron and Emery. In places the faulting is in a single plane, while in others it is compound, resulting in a series of steps or zone of shearing. The block or band of faulted strata west of Ferron and Emery varies from  $1\frac{1}{2}$  to 3 miles in width. The largest faults here are on the sides of the block, and the country between them has been depressed downward nearly 300 feet. The fault scarps facing the depressed block at the north side of Ferron Canyon are very pronounced. Conglomerate and shale of supposed Tertiary age occur on this downthrown block at lower elevations than the Laramie sandstone on either side. Several intermediate faults extending parallel to those on the side deform the down thrown block. Some of these minor fault blocks are tilted so that the beds dip as high as 20 degrees.

#### COALS.

The workable coal beds that have been mined or prospected to any important extent are found in the lower 250 feet of the coal-bearing strata described above. These coals are associated with prominent sandstone beds that can be recognized with ease and assurance by the prospector. They crop out in the lower cliffs and in the more accessible parts of the canyons and valleys.

*Quality of the Coal.*—The workable coals in the Book Cliffs field, with a few exceptions in the thinner beds, have the same physical characteristics, though the beds range in thickness from 4 to 20 feet and in a few instances more than 20 feet. The coal is usually free from shaly impurities and is massive. So pronounced is the massive nature where the coal is fresh that seams or lines indicating stratification are scarcely discernible. It mines in irregular blocks, often of large size. A bed 15 to 20 feet thick is inclined to spall in large irregular slabs several feet in extent across the bedding. The coal is not usually affected nor does it slack to any appreciable extent on exposure to weathering agents. It is black and for the most part has a bright luster. It usually contains small, irregular inclusions of a yellowish, brittle, resin-like bituminous substance scattered here and there that yields an asphaltic odor on ignition. The following proximate chemical analyses give a fair idea of the composition of the coals. The samples for analysis were collected from the several beds in the lower part of the coal-bearing section and from localities scattered between Huntington Canyon and the Wasatch Plateau and Horse Canyon, a point 60 miles distant in the Book Cliffs southeast of Sunnyside. The method of selecting samples of coal for analyses is as follows: A clean surface of the whole bed at the face of the working is selected, or a section of about 6 inches in width is made clean by removing the surface. Then a channel 3 to 4 inches in width and of even depth is cut down the cleaned surface, so that an equal amount of coal is obtained for each unit of a section. This coal so removed is placed on a clean surface and immediately broken to lumps half an inch and less in diameter and thoroughly mixed. The sample is then quartered opposite quarters being taken and remixed. The quartering, selecting and mixing process is continued until the sample is reduced to about 1 quart, which is placed in a galvanized-iron can, sealed, and shipped to the laboratory.

The Book Cliffs coals are clearly within the bituminous grade, and are remarkably uniform in composition. The sulphur content is also uniform and low, the average being a little above one-half of one per cent.

PROXIMATE ANALYSES OF COALS FROM THE BOOK  
CLIFFS AND FIELD, UTAH.\*

No.	Location	Moisture	Volatile matter	Fixed Carbon	Ash	Sulphur	Loss of Moisture on Air Drying
1	Horse Canyon, sec. 4 (3), T. 16 S., R. 14 E.	4.76	38.16	52.09	4.99	0.74	1.00
	Upper bed. No. 1 mine Sunnyside.	3.37	38.04	52.75	5.84	.60	1.30
3	Average of crushed coal, prepared for coking, from all mines, Sunnyside.	3.43	37.72	51.68	7.17	.78	1.50
4	Dugout Canyon, sec. 23, T. 13 S., R. 12 E.	4.98	38.20	52.94	3.88	.54	2.40
5	Bean prospect, Coal Creek Canyon, sec. 10, T. 13 S., R. 11 E.	4.09	38.06	52.50	5.26	.48	1.10
6	Gilson prospect, Coal Creek Canyon, sec. 3, T. 13 S., R. 11 E.	5.42	36.32	52.16	6.10	.54	1.00
7	Western part of Castle Gate mine.	4.72	39.13	48.45	7.70	.49	1.30
8	Eastern part of Castle Gate mine.	6.13	40.07	45.45	8.26	.56	3.50
9	No. 1 mine, Winter Quarters	8.10	40.21	45.91	5.73	.86	3.90
10	Clear Creek mine, Clear Creek	7.02	41.89	45.80	5.29	.57	3.10
11	Huntington Canyon, Bear Gulch prospect, NE. ¼ sec. 11, T. 14 S., R. 6 E.	5.19	43.89	46.91	4.01	.31	2.30
12	Huntington Canyon, near center of S ¼ sec. 24, T. 16 S., R. 7 E.	6.04	38.96	48.40	6.60	.83	2.90
13	Larson Brothers' mine, sec. 2, T. 15 S., R. 6 E.	8.46	41.17	46.09	4.28	.48	3.50
14	Emery coal mine, † sec. 2, T. 23 S., R. 6 E.	5.11	36.71	50.42	7.76	2.06	.80

\* These analyses were made by the United States Geological Survey coal-testing plant at St. Louis, F. M. Stanton, analyst.

† The Emery coal is in the sandstone of the Red Plateau, 1,500 feet or more stratigraphically below the Book Cliffs coals.

DESCRIPTIONS OF THE COAL BEDS.

*Horse Canyon.*—A coal bed is exposed in Sec. 4, T. 16 S., R. 14 E., near the base of the coal-bearing series. The bed is 14 feet 11 inches thick and is being opened for development. The coal is clean and massive. The floor is a massive sandstone. The roof of sandstone and shale 4 feet thick is succeeded by 2 feet of coal. The same bed was reported to be of equal thickness at prospects in Secs. 3 and 9 of the same township.

*Sunnyside Coals.*—Two coal beds are mined by the Utah Fuel Company at Sunnyside near the mouth of Whitmore Canyon, in Sec. 32, T. 14 S., R. 14 E., and Sec. 5, T. 15 S., R. 14 E. These coal beds are near the base of the coal-bearing series. The lower coal



ranges from 5 feet 3 inches to 6 feet 5 inches in thickness, while the upper bed, 30 feet above, averages about 5 feet 10 inches. Between the two beds are 30 feet of shale, sandstone and thin coal. The lower Sunnyside coal contains a few thin and locally bony lentils. Its luster is rather dull and it is classed by the miner as "dead" coal. The upper bed is clean and bright. It yields considerable gas on mining and is referred to as a "live" coal. Two mines are in operation here. Both beds are worked from No 1 mine, while No. 2 mine is confined to the lower. All of the coal is run to a single tippie and is crushed and the entire product coked, the larger part in the coking plant at Sunnyside, the remainder being taken to the ovens at Castle Gate.

The composition of the upper coal (No. 2 of the table) is almost identical with the Horse Canyon coal (No. 1). The analysis of the crushed product from all the Sunnyside mines shows a slightly higher percentage of ash and lower proportions of volatile matter and fixed carbon. The ratios between the volatile matter and fixed carbon, however, as indicated in the two analyses, are essentially the same.

*Bear Canyon.*—A traverse of the Book Cliffs scarp across T. 14 S., R. 13 E., which has not been subdivided into sections, locates the coal prospects of Bear Canyon in the N.  $\frac{1}{2}$  Sec. 10. Two prospect pits have been dug in the east fork of the canyon, on the coal at the base of the series. The bed has been partially burned near the outcrop and only 4 $\frac{1}{2}$  feet of coal is exposed in the excavation.

*Rock Canyon.*—A coal bed 5 feet 10 inches thick is exposed by prospect in the SE.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  Sec. 32, T. 13 S., R. 13 E. This coal is near the same horizon as the Sunnyside coal, being probably below the lower bed at that place.

*Pace Canyon.*—Prospecting has been done in the NW.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  Sec. 30, T. 13 S., R. 13 E., where the coal has been burned near the surface. A tunnel has been driven 50 feet on the burned bed, reaching the edge of the fresh coal. Five feet of fresh coal is exposed in another prospect, where the upper part was concealed. These coals are in the lower part of the coal-bearing series.

higher in the section, is 5 feet thick and its quality is shown by analysis No. 6. There is an intermediate bed, 5 feet 4 inches thick, but it contains a thin parting of bony coal. The lowest bed, 3 feet thick, is 200 feet below the lower mine.

*Deadman Canyon.*—A coal bed 6 feet 10 inches thick has been prospected in the SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  Sec. 7. T. 13 S., R. 11 E. It is estimated to be the same as the lowest bed mined in Coal Canyon. A parting of shale occurs 16 inches below the top. Otherwise the coal appears to be equal to the corresponding bed mined in Coal Canyon.

*Cordingly Canyon.*—A coal bed 4 feet 3 inches thick has been opened in the east fork of Cordingly Canyon, in the NW.  $\frac{1}{4}$  Sec. 14, T. 13 S., R. 10 E. The coal has a shale roof and a massive sandstone floor. It has a bright luster and is clean, but fractures easily, and a considerable quantity of slack is produced in mining. This coal is apparently at the base of the coal-bearing series. A coal bed 14 feet thick occurs 125 feet higher in the section, between a massive sandstone 60 feet thick below and another sandstone 6 to 8 feet thick above. A thin and variable parting of gnarly, sandy shale occurs 4 feet below the top of the coal. The coal is massive and lustrous, but breaks readily into blocks in mining, in a similar manner to the lower bed. A short tunnel or drift has been run on this coal in the SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  Sec. 11.

*Ballinger Mine.*—The basal coal of the series is mined in the west fork of Cordingly Canyon, in the SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  Sec. 10, T. 13 S., R. 10 E. The coal is 20 feet thick, massive, and comparatively hard. It mines for the most part in large irregular blocks. Sandstone occurs in contact both above and below. This coal is mined and transported by wagon for domestic use in the town of Price. Large rooms are excavated and wagons are driven into the face of the working to be loaded.

*Wade Prospects.*—Three coal beds are exposed in the prospects of Wade and Lawley, in the SW.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  Sec. 16, T. 13 S., R. 10 E. These coals occur in the lower 160 feet of the coal-bearing series. The lowest coal is the same as that in the Ballinger mine. It is 20 feet thick and massive. It rests directly on a solid

sandstone and has a shaly sandstone roof. The second coal, 40 to 50 feet above, is similar in structure and appearance to the first. It is 8 feet 6 inches thick and lies in contact with the sandstone above and below. Of the third coal only the lower 15 feet are exposed. The excavation has not penetrated the weathered coal in the upper part, where the top of the bed is concealed. A thin shaly parting occurs 2½ feet above the base of this coal. The lower coal in this section is exposed in three openings in the west fork of Bull Canyon, near the south side of Sec. 9, T. 13 S., R. 10 E.

*Panther Canyon.*—Two prospects have been driven on the coal at the base of the series in the NW. ¼ NW. ¼ Sec. 8, T. 13 S., R. 10 E. The coal has been burned near the surface in this vicinity and the shallow excavations revealed only a part of the coal.

*Castle Gate Mine.*—One of the coals near the base of the coal-bearing series is mined at Castle Gate. The coal is worked in a series of slopes driven on the rise of the bed toward the south. At the entrance to the tenth rise in the northern part of the mined area the coal is a little more than 4 feet thick. At the face of the coal in the first rise in the southwestern part of the mine the thickness is 6 feet, while in the southeastern part it is 10 feet. At intermediate points it varies between these extremes. The coal is usually massive and clean. The floor is a solid sandstone and lies in low rolls or undulations, being so uneven that mining machines cannot be successfully used. The roof is usually sandstone. The shales occur locally at the contact of the coal. The quality of the Castle Gate coal is shown by analyses Nos. 7 and 8 of the table (p. 294). The mine has been driven through the ridge in places to a fringe of burned coal. The width of the burned area varies and the high temperature of the rock in places where the boundary is approached indicates that spontaneous combustion of the coal probably has not entirely ceased.

*Spring Canyon.*—The lowest workable coal in the series is opened in two small mines in sec. 9, T. 13 S., R. 9 E. The first, known locally as the Rhodes mine, is near the center of the section in the gulch leading into spring canyon. The coal is in three parts and the section is as follows:

side of SW.  $\frac{1}{4}$  sec. 11, and both prospected and mined in the NW.  $\frac{1}{4}$  sec. 13 T. 12 S., R. 7 E. At the first locality the coal is  $3\frac{1}{2}$  feet thick, while at the second  $3\frac{1}{2}$  to 4 feet of coal is exposed, the base being concealed. In each instance the coal rests on thick white sandstone. The coal is near the top of the coal bearing series. A coal is mined for local use near the center of sec. 2, T. 12 S., R. 6 E. The bed is 4 feet thick and the coal seems to be of good quality. It is apparently stratigraphically above the formation recognized as coal bearing in the Book Cliffs field. Prospectors who have worked at Winterquarters and Clear Creek are of the opinion that extensive north-south faults occur on the west side of Pleasant Valley, and that these faults explain the occurrence of coal in the high country in that vicinity. The smooth surface of the country makes it exceedingly difficult to demonstrate the existence of such faults, and without the evidence of such stratigraphic correlation it cannot be asserted that these high coals are to be classed with those occurring near the base of the valley at Scofield, Winterquarters or Clear Creek.

*Scofield.*—Mines once operated by the Union Pacific Railroad Company are located one-half mile southeast of Scofield. It is reported on reputable authority that the coal is 25 to 30 feet thick. Only the middle portion of the bed was worked, it is explained, because the coal formed a better roof than the overlying shales. A cave-in has occurred toward the south end of the coal workings, exposing about 30 feet of strata above the coal in the mine, including three beds of coal. The lowest of these beds is 14 inches thick, the middle 5 feet, 3 inches and the uppermost 9 feet. The coal of the two thicker beds appears to be of fair quality.

*Winterquarters Mines.*—Coal is being mined on a large scale in the south side of the canyon at Winterquarters, which is located in the E.  $\frac{1}{4}$  sec. T. 13 S., R. 6 E., and the W.  $\frac{1}{4}$  sec. 6, the entrance, near the center of the east side of sec. 1, T. 13 S., R. 6 E. to 16 feet at the face of the coal in the southeastern part of the working, near the center of sec. 7, T. 13 S., R. 7 E. The coal is massive and generally clear of shaly impurities. Analysis No. 9 (see table above, p. 294),

made from samples selected at the face of the working in the southeastern part of the mine is almost identical with that of the Castlegate coal. The same bed has been worked quite extensively from openings in the north side of the canyon at Winterquarters; also in the south side east of the town and near the center of the W.  $\frac{1}{2}$  sec. 6 T. 13 S., R. 7 E.

Two distinct east-west faults were encountered in mine No. 1. Along the one on the north the downthrow is 40 feet, on the south and along the other the down throw is 90 ft. on the north. The result is an east-west dropped block a few hundred feet in width. The coal rises toward the south at an angle of about  $3^{\circ}$  and the downthrown block is overcome in mining by increase in the grade of the slope.

The coal and associated strata in mine No. 1 and in the mine opposite on the north side of the canyon are cut by a number of dikes of basic igneous rocks bearing east and west. The dike in the south mine, nearly 150 feet from the entrance, is approximately vertical 5 feet in width at the floor and 1 foot at the roof. It swells to a width of 10 feet in the coal bed, which is here 9 feet thick and has metamorphosed the coal, producing a coke-like substance to a distance of 2 to 3 feet on each side. The dike in the northern mine occurs about 300 feet from the mouth of the slope. It is approximately 10 feet thick and has coked the coal in a similar manner as in mine No. 1. Thin dikes of igneous rock 1 foot and less in thickness are reported by Superintendent Thomas J. Parmley to occur at other places in these mines. Such thin dikes, it is stated, do not metamorphose the coal appreciably.

*Crandall Canyon.*—A coal bed is mined for local consumption in the SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  sec. 13, T. 13 S., R. 6 E., near the head of Crandall Canyon. This canyon leads into Pleasant Valley midway between Scofield and Clear Creek. The coal is approximately 12 feet thick and is massive and clean. It is mined on the rise toward the south.

*Clear Creek.*—This mine is in the town of Clear Creek, near the head of Pleasant Valley. The Clear Creek coal varies in thickness in a north-south direction through the mine working, a length of nearly 7,000 feet. In the southern part the coal is massive

and is 13 feet, 5 inches thick. No shaly or other impurities were noted. Near the center of the workings a thin shale parting enters the coal. Toward the north and within a distance of 2,000 feet the shale swells to a thickness of sixteen feet, dividing the coal into two benches. In the northern part of the mine, where the shaly parting is thick, only the upper bench 4 to 6 feet thick, is worked.

Several small north-south faults occur near the outcrop, displacing the coal vertically from 5 to 40 feet. Nearly 2,200 feet east of the entrance to the mine a large fault occurs, bearing a few degrees east of north, by which the coal is displaced out of sight. The amount of throw was not determined.

Coal was being prospected in rocks apparently above the coal bearing series hitherto recognized in the SW.  $\frac{1}{4}$  sec 31, T. 13 S., R. 7 E., near the head of the gulch bearing west from Clear Creek. The coal bed is about 10 feet thick and it is regarded by the prospectors as being the same as one of the workable beds found in Pleasant Valley, 1,000 to 1,100 feet lower in the section. The rocks in this region, as elsewhere in the Book Cliffs field, are almost horizontal, and the coal in Huntington Canyon, 2 miles southwest of the prospect is near the same stratigraphic position and about the same elevation above sea level as the Clear Creek coal. If the position of the coal near the head of the gulch west of Clear Creek is explained by faulting, as claimed by prospectors, two faults instead of one are required, and it will be necessary to show that a part of the high country between Huntington Canyon and Pleasant Valley is faulted upward a thousand feet or more. Certain thick and distinct sandstone beds, always associated with the lower coals, were noted in the vicinity of the prospects west of Clear Creek. Rock exposures are less frequent, however, toward the mountain tops than in the lower parts of the canyons.

*Miller Canyon.*—Two coal beds have been exposed by prospect near the center of the N.  $\frac{1}{4}$  sec. 32, T. 15 S., R. 8 E. The lower bed ten feet thick, is apparently 25 feet above the horizon of the lowest coal in the Book Cliffs section. The second bed is 4 feet thick, and is separated from the first by five to six feet of shale. The upper coal is overlain by massive sand-

stone. Near the center of the west side of sec. 20 several beds of coal occur near the base of the coal-bearing rocks in natural exposures. Some of these give evidence of workable thickness, though the coal is disintegrated at the surface.

*Cedar Canyon.*—The basal coal in the Book Cliffs section has been worked occasionally for a number of years in the north side of Cedar Canyon, in the SW.  $\frac{1}{4}$  sec. 9, T. 16 S., R. 8 E. The coal is 20 feet thick and is separated locally into three benches by variable, thin, bony, and shaly partings. The lower bench, 11 feet thick, is massive and clean. The middle bench is 5 feet thick and the upper bench 4 feet. The coal lies on massive sandstone and is succeeded by beds of thin and shaly sandstone. A tunnel 300 to 400 feet long has been driven toward the north on the lower coal, a short distance west of the present working, in the SE.  $\frac{1}{4}$  sec. 8. The coal in this mine varies in thickness from 16 to 20 feet, and it is reported by one of the operators that no shaly partings were found. The operations in Cedar Creek are conducted by Messrs. Howard & Sons of Huntington, and they are known as the Howard mine. A coal bed is partially exposed in the north side of the canyon 400 feet stratigraphically above the Howard mine. Several feet of disintegrated coal are shown, but the full thickness of the bed was not determined.

*Huntington Canyon.*—Systematic prospecting has been done in Huntington Canyon through Tps. 16 and 17 R. 7 E. The prospectors confined their attention to the coals in the lower part of the coal-bearing section, and it is reported by the State coal-mine inspector that more than 1,000 openings have been made on these beds.

Twelve or more prospects have been made exposing workable coal beds in Bear Gulch, in sec. 24 and 25, T. 16, S., R. 7 E. Two of the lower coals are exposed on the west side of the gulch, in the north-west corner of section 25. The section of coals and associated rocks is as follows:

SECTION IN BEAR GULCH, NW.  $\frac{1}{4}$  SEC. 25 T. 16 S., R 7 E.

	FEET.
1. Heavy sandstone	
2. Shale .....	1.5
3. Massive coal.....	10
4. Shale and sandstone alternating beds; the sandstone at the top makes the floor of the upper coal.....	40
5. Sandstone .....	17
6. Shaly roof. ....	1
7. Massive coal.....	12
8. Massive sandstone; base of lower coal.	

Five other beds of workable coals, aggregating a thickness of 48 feet, are reported independently by two reputable prospectors to have been opened at several places in 300 feet of strata on the east side of the gulch, in the S.  $\frac{1}{4}$  sec. 24. Several prospects have been made on some of these coals, also in the west half of the same section.

A massive coal bed, 13 feet, 4 inches thick, situated near the base of the coal-bearing section, is mined for local use in Deer Gulch, in the NW.  $\frac{1}{4}$  sec. 11 T. 17 S., R. 7 E. A coal bed 3 feet thick has been prospected on the west side of the gulch, near the middle of the east side of sec. 10. This coal is about 175 feet above the coal in the mine.

A coal bed partially burned, exposed in Meeting House Gulch, in the NE.  $\frac{1}{4}$  SE.  $\frac{1}{4}$  sec. 34, T. 16 S., R. 7 E., shows 3 feet of coal. Two beds of coal are opened in three prospects near together in Ridley Gulch, near the northeast corner of sec. 28. The lower of these two beds, 12 feet thick, is at the base of the coal-bearing series, and rests on massive sandstone. The other bed, partially burned, occurs 25 feet higher in the section. Five feet of coal are exposed. A number of other prospects have been made on coal farther up the gulch in the same section.

A coal bed 9 feet thick, at the base of the coal-bearing series, has been prospected at the mouth of Trail Gulch, near the center of the NE.  $\frac{1}{4}$  sec. 22, T. 16 S., R. 7 E. It rests on massive white sandstone and is overlain by four feet of blue shale. On the east side



of the gulch, near the southeast corner of sec. 15, a coal bed 5 to 6 feet thick is exposed. Farther up the gulch, near the west side of sec. 14, two prospects are reported as showing 8 feet of coal. Coals in the lower part of the series have been prospected in many other localities in Huntington Canyon, notably in Mill, Crandall and Tie gulches, in secs. 21, 16, 5, and 3, T. 16 S., R. 7 E.

*Connellville Mine.*—Coal has been mined at various times for a number of years in Huntington Canyon in sec. 11, T. 14 S., R. 6 E. The early settlement here was named Connellville. At the present time all habitations are removed except a few for temporary occupation of miners. The coal is mined and hauled to Fairview for domestic consumption. In the only mine now operated the coal is 9 to 11 feet thick. The same bed has been worked at a number of places near the mine and the coal was once coked in a few ovens now fallen into decay. Several prospects have been made in the vicinity near the base of the series, but they were not open for inspection.

*Larsen Mine.*—A coal bed eight feet thick is located in the SE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  sec. 2, T. 15 S., R. 6 E., near the head of the west fork of Huntington Canyon. It is owned and mined at the present time by Messrs. P. A. and L. Larsen to supply domestic fuel for the town of Mount Pleasant. The quality of coal, as shown by analysis No. 13 (see table p. 294), is essentially the same as coals tested from other parts of the Book Cliffs field. The coal occurs between beds of massive sandstone about 350 feet above the base of the coal-bearing series. A bed of coal 3 feet thick is reported by Larsen Brothers to occur about 130 feet below the mine.

*Otterson Mine.*—A coal bed at the base of the series, located very near the south side of the NE.  $\frac{1}{4}$  sec. 26, T. 17 S., R. 7 E., is mined occasionally for domestic consumption at Castledale. The workable part of the bed is 11 feet, 10 inches thick, but is divided by a thin parting of shale. The coal seems to be of the average grade of coals in the Book Cliffs field.

## SECTION OF COAL AND ASSOCIATED ROCKS AT OTTERSON

## MINE.

	FT.	IN.
1. Coal crop, weathered.....		
2. Massive sandstone.. . . . .	50	
3. Thin coal seam.....		
4. Shaly sandstone. . . . .	10	
5. Coal.....	1	
6. Shale.....	1	
7. Coal.....		8
8. Shale .. . . . .	1	
9. Coal, upper bench... . . . .	5	10
10. Thin shale parting.....		
11. Massive coal, lower bench.....	6	
12. Bony coal.. . . . .	1	
13. Sandstone.....	3	
14. Sandy shale.....	4	
15. Massive sandstone.....	60-80	

*Reed Mine.*—A coal bed near the same stratigraphic position as that worked at the Otterson mine has been opened for local use near the center of the south side of sec. 22, T. 17 S., R. 7 E. The coal is 7 feet, 6 inches thick and rests on massive white sandstone. The roof of the coal is a thin, bony shale that is overlain by 60 to 80 feet of sandstone. Both the Reed and the Otterson mines occur in the cliffs near the heads of gulches leading toward the south, and are approached by steep, graded wagon roads.

*Johnson Mine, Cottonwood Canyon.*—The Johnson mine is driven on a bed of coal 7 feet 10 inches thick, situated on the west side of cottonwood Canyon, in the SW.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 25, T. 17 S., R. 6 E. The floor of the coal is a massive white sandstone. Shaly sandstone 3 feet thick forms the roof. A coal bed 5 feet thick is reported by Mr. Johnson, the operator of the mine, to occur above the shaly sandstone; also 50 feet higher in the section a bed 3 feet thick is said to have been found. A bed of shale and bony coal occurs 50 to 60 feet below that of the Johnson mine, but it has been proved to be of no value.

*Ferron Canyon.*—A coal bed 8 feet thick is reported by reputable authorities to occur in Ferron Canyon west of the faulted area in T. 19 S., R. 6 E. The township has not been divided into sections. A traverse up the canyon to the vicinity of the prospect locates it near where the southeast corner of sec. 19 will be placed.

*Quitchoyah Canyon.*—The outcrops of coal-bearing strata in Quitchoyah Canyon extend westward into the unsurveyed part of the Wasatch Plateau. A coal bed reported to be 6 to 10 feet thick has been prospected near the base of the coal-bearing rocks in the NE.  $\frac{1}{4}$  sec. 17, T. 22 S. R. 5 E. Another prospect exposing 16 feet of coal is said to have been made in the canyon near the eastern and unsurveyed part of T. 22 S., R. 4 E. Time did not permit an investigation of these prospects.

*Ivie Creek Canyon.*—Ivie Creek Canyon is situated near the south end of the Book Cliffs field. Coal beds near the base of the series have been prospected on Clear and Red Creeks, which flow northward from Mount Hilgard into Ivie Creek; also on Ivie Creek near the mouth of Red Creek. In no instance was the whole thickness of the coal exposed. A prospect on Clear Creek, near the center of the north side of sec. 10, T. 24 S., R. 4 E., showed 6 feet of weathered coal without exposing the base of the bed. A coal prospect on Red Creek, near the north side of the NW.  $\frac{1}{4}$  sec. 3, T. 24 S., R. 4 E., appears to be on the same bed as that opened on Clear Creek. Three feet of the upper part of the bed are exposed in the Red Creek prospect. Two coal beds have been opened in shallow prospects on the north side of Ivie Creek, in the Sw.  $\frac{1}{4}$  sec. 34 T. 23 S., R. 4 E. The beds are decomposed and it is believed the exposures do not represent the true thickness of the coal. The upper exposure shows 2 feet, while the lower is 4 to 5 feet thick. The intervening strata consists of 18 feet of shale.

*Emery Coals.*—These beds occur in association with the sandstone that lies stratigraphically below the shale of Castle Valley. They are exposed in the breaks and bluffs of Muddy Creek 4 to 6 miles southeast of Emery. The beds are referred to as the Emery coal, since they are utilized to supply Emery with

domestic fuel and the town owns the land in which the most valuable mine is situated. A section of the strata including the coals is given above (p. 294), in the discussion of the sandstones in the Red Plateau. Two coal beds of workable thickness were noted. The lower coal is variable both in thickness and in respect to its included strata of bone and shale. A tunnel has been made on the lower bed near the center of sec 26, T. 22 S., R. 6 E. The coal occurs in two partings separated by 14 inches of shale. The lower workable bench consists of 6 feet of bony coal. The upper layer is 14 inches thick. Across the gulch in which the mine occurs the coal seems to thin out within a distance of one-fourth mile. A coal bed near the same position in the strata crops out in the cliffs on the west side of Muddy Creek Canyon, in the NE.  $\frac{1}{4}$  sec. 35 T. 22 S., R. 6 E. The coal is in three benches and is similar in quality to that at the mine. The lower and middle benches are each 2 feet thick, while the upper is 1 foot 9 inches. They are separated by bands of bony shale 4 to 6 inches thick.

*Emery Mine.*—An upper coal bed occurs 125 to 150 feet higher in the section and within 50 feet of the top of the sandstone series below the shale of Castle Valley. This coal is in a single massive bed 5 feet thick. It is encased in shale and adheres to the roof and floor so strongly that it is separated with difficulty in mining. The coal contains no shaly or bony partings and compares favorably in composition with coals of the Book Cliffs series, as shown by its analysis (see table, p. 294). The mine is situated in the NE.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  sec. 2, T. 23 S., R. 6 E., on the highland west of Muddy Creek Canyon. A drift has been driven 50 feet on the coal and two rooms have been turned.

#### CONCLUSION.

With the possible exception of one or two coal beds occurring in the high land west of Pleasant Valley all the coals of value known at the present time in the Book Cliffs field are found in the lower part of the coal-bearing strata and near the base of the Laramie formation. At no locality investigated was it found that the entire coal-bearing section had been

thoroughly prospected. The beds in the lower part of the series are the more conveniently situated for exploitation and were found usually of ample thickness for profitable working. For these reasons the attention of the prospector and miner has been devoted to them. At every locality investigated for more than 100 miles in the Book Cliffs field, coals ranging from 3 to 20 feet in thickness were found where the lower part of the section of the coal-bearing series had been carefully prospected.

The coals in the different parts of the field are remarkably uniform in their physical characteristics. They are black, moderately hard, and usually massive. Occasionally shale partings occur in the bed, but one or the other, and sometimes both benches are sufficiently thick to be profitably mined.

The composition of the coals in various parts of the field and in several beds varies but little, in so far as proximate chemical analysis show. The fuel ratios in the 14 samples analyzed range between the extremes of 1.06 and 1.46. The content of sulphur is remarkably low and uniform. The coking property of the coals has been tested in but few localities, and of these only the coals mined at Sunnyside are known to be coked.