Eleventh Biennial Report

OF THE

State Coal Mine Inspector

1903-1904

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1905
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LETTER OF TRANSMITTAL.

Denver, Colo., Dec. 31, 1904.

To the Honorable
JAMES H. PEABODY,
Governor of Colorado.

Dear Sir—In compliance with section 17 of an act entitled "Coal Mines," I have the honor to submit to you the eleventh biennial report of this department.

Thanking you for many courtesies, I am,

Yours respectfully,

JOHN D. JONES,
State Coal Mine Inspector.

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INTRODUCTION.

During the past two years the coal resources of the State of Colorado have been more extensively explored than at any preceding period, and development of properties has been begun that will in the next few years greatly increase the coal production of this State. Commercially, the mines have not achieved their highest mark in the past fourteen months, on account of the strike, which closed or crippled many of the heavy producers, as well as the small ones, so that the tonnage in 1904, instead of being 10,000,000, is only 6,776,551 tons.

Nominally, the strike is still on, although nearly all the mines are working at full capacity with non-union men, and the output is approaching the maximum mark it had prior to the strike. What has been remarkable is the fact that despite the strike, which usually paralyzes business and development, a greater activity has been manifested in coal mining than has been evident in the past. As has been stated above, more coal lands have been bought, leased and investigated, with the result that many new mines have been opened up, some of them on an extensive basis, which will necessitate the building of railroad branches to haul the product, and which means the expenditure of many thousands of dollars for equipments. Numerous improvements for the sanitary and safe condition of many of the older mines, including equipments in keeping with advanced methods of mining, have been introduced; many new fans installed, air-shafts sunk, etc.

Mine inspections have been made as regularly and frequently as the limited force of the department would permit. Many recommendations, both oral and written, were given, and nearly always complied with. Precautionary measures for the protection and health of the employes have been adopted at many mines, some voluntarily and others at our request.

In 1903 the rate of fatal accidents was very low in comparison with that of former years, but in 1904 the fatalities were above the average, which is to be deeply deplored, and is attributed directly to the fact that thousands of the miners filling the places of the strikers were unfamiliar with coal mining in Colorado. Over two-thirds of the accidents were caused by falls of rock and coal, which in many instances could have been avoided by proper timbering. I regret to have to state that in all such cases the investigation showed that a suitable supply of timber or props were at hand, and that often instructions had been given by the mine boss to the miner, just prior to the accident, to timber his place, and compliance promised, but postponed. Indeed, considering the large number of incompetent miners employed in our coal mines, since the strike has been inaugurated, it is amazing that the fatalities are not more. This may sound severe, and it is with reluctance that I make this statement, but unfortunately it is true, as a comparison of the number of fatalities in 1904 with that in 1903, the latter year being one when experienced miners were working the mines, and the difference in the output, corroborates the assertion. The sad disaster at the Tercio mine, whereby nineteen lives were lost, was the most appalling one in several years, and was the result of an explosion, a report of which is found in the list of fatal accidents.

The law governing coal mining in Colorado is very incomplete, yet the march of progress forces compliance to many requirements in keeping with the most advanced methods of mining that are not demanded by our statute; especially is this true in reference to ventilation, which is receiving careful attention by all intelligent operators, and many beneficial improvements have been made along that line.

I wish to thank the mine officials for the courtesy extended to us and readiness with which in most cases they complied with our recommendations for improvements. I have also to thank them for much information and aid given me in getting data for this biennial report, information requiring time and labor.

At the beginning of the biennial term, Mr. W. B. Lloyd was appointed deputy inspector and performed his duties in an intelligent, and conscientious manner, but at the end of seven months he resigned to take a position with the Raton Coal Co., Blossburg, N. M. Mr. David J. Griffiths was temporarily appointed to fill the vacancy, pending an examination called by Governor Peabody, who recommended that I appoint the man who passed with the highest percentage. Mr. Griffiths was the most successful candidate, and was then regularly appointed. He fills his place with credit, as he is competent, faithful and unbiased, therefore well qualified for the performance of the duties of this office. There was one other successful applicant.

who passed the examination with credit, Mr. William Lewis, of Porter, Colorado.

I submit this report with the regret that I could not make it more complete, covering the ground with greater thoroughness. But, as stated before, with only two men in the field and 175 mines scattered over a wide territory, to be inspected, and a large list of fatal accidents to be investigated, no time is left for careful research or the compiling of statistics. In addition, the law governing coal mining makes the year close the last day of December, and demands that the biennial report be handed to the Governor on the first day of January. For one year of the biennial period the output for December is estimated, and we can not get correct returns in until the middle of January, and the figuring has to be rushed to get the report into the hands of the publisher. Therefore, I beg indulgence for the brevity with which many important points are handled, of which a careful research would interest coal operators and employes. I can only hope that the next report may be more worthy of the great coal industry of this State.

RECOMMENDATIONS.

The statute governing coal mining in the State of Colorado needs a general revision to meet the increased demands of this industry. When the present law was enacted in 1883 the total production was only 1,220,593, but it has increased to such an extent that the conditions require a more stringent supervision. I beg to call attention to a few of the many needed requirements that should be covered:

(1) The year should end on June 30th instead of December 31st, so that the biennial report could be published and be ready for the beginning of the legislative session, and not at the end, as is now the case.

(2) The law should require the sprinkling of non-gaseous as well as gaseous mines.

(3) Maps of the extreme points worked in a mine should be made before they are finally abandoned, as such a map would be a guide of safety to those operating mines adjacent to one abandoned and inundated.

(4) All mines, whether employing one man or a hundred men, should be under the jurisdiction of the department and subject to the same law.

(5) Second openings should be made immediately when the first is ready for operation, and not after 15,000 square yards have been excavated.

(6) New mines opened should report to this department no later than 30 days after operations have commenced, giving location, name of company, name of superintendent and post-office address.

(7) The statute should compel the splitting of air currents, thus increasing the quantity circulating, giving fresh air to each district and minimizing fatalities in case of an explosion. It is also a more economical method of ventilating.

BRIEF STATISTICS.

	1903	1904
Number of mines in operation	160	175
Tons of lignite coal produced	1,176,248	1,238,187
Tons of semi-bituminous coal produced	826,472	614,571
Tons of bituminous coal produced	5,593,618	4,738,389
Tons of anthracite coal produced	48,964	55,404
Tons of unclassified coal produced, estimated	130,000	130,000
Total tonnage of coal produced	7,775,302	6,776,551
Total tons of coke produced	746,125	591,351
Total number of coke ovens	3,233	3,376
Number of employes in and about the mines	10,296	10,769
Number of employes at the coke ovens	1,350	914
Number of fatal accidents	40	89
Number of non-fatal accidents	110	118
Number of employes for each life lost	257.2	121
Number of employes for each non-fatal accident	93.6	91.2
Tons of coal mined for each non-fatal accident	70,684.5	57,428.4
Tons of coal mined for each life lost	194,382.6	76,141

Coal and Coke Production for 1903.

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Simpson	Mitchell	Gladstone
Thickness of vein	14 ft.	14 ft.	12 ft.
Kind of opening	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite
January	23,387	6,143	1,918
February	21,885	5,016	145
March	20,575	4,503	1,460
April	19,983	4,563	1,629
May	7,861	1,777	862
June	1,015	674	428
July	3,892	3,462	782
August	10,280	5,122	778
September	19,518	4,810	968
October	18,676	4,389	1,167
November	5,364	1,223	230
December	25,663	6,905	1,798
Totals	177,139	48,587	12,165

BOULDER COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Hecla	Rex No. 1	Rex No. 2	Gorham	Industrial	Monarch
14 ft.	6 to 10 ft.	6½ ft.	7 to 12 ft.	7 ft.	6 ft.
Shaft	Shaft	Shaft	Slope	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
11,398	12,903	12,145	5,793	7,816	7,036
8,178	10,224	14,922	5,083	6,056	6,485
5,254	7,486	9,646	3,791	5,925	7,216
7,732	Idle	10,917	3,828	1,977	7,107
2,645	307	4,510	1,531	1,957	4,648
4,235	937	5,830	1,944	1,828	4,840
3,339	1,024	9,689	2,728	Closed	4,239
6,460	1,024	5,652	3,614	for	4,902
9,537	5,126	13,211	4,637	repairs	6,406
6,899	9,987	15,212	5,243	6,325	6,720
2,721	2,685	3,791	865	1,939	1,412
8,126	9,885	11,106	5,213	8,210	7,925
76,524	61,588	116,631	44,270	42,033	68,936

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Strathmore	Tynon	Broadside Clark No. 8
Thickness of vein	12 ft.	4 to 5 ft.	8 ft.
Kind of opening	Shaft	Shaft	Slope
Character of coal	Lignite	Lignite	Lignite
January	4,933	4,072	183
February	4,387	1,199	148
March	3,227	1,514	95
April	3,227	848	45
May	2,860	760	15
June	1,558	959	25
July	2,471	832	21
August	1,262	815	241
September	2,279	1,638	328
October	3,063	2,868	470
November	1,036	725	514
December	4,310	2,798	650
Totals	34,613	19,028	2,745

BOULDER COUNTY, 1903—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Fox	Sunnyside	Storrs	Shanahan	Rosser No. 7	Haywood
8 ft.	4 ft.	5½ ft.	11 ft.	5 and 6 ft.	4 to 10 ft.
Shaft	Shaft	Shaft	Slope	Drift	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
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.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
43,750	1,400	776	6,000	3,835	35,407
43,750	1,400	776	6,000	3,835	35,407

PRODUCTION OF BOULDER COUNTY, 1903.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Vaughn	Black Diamond	Matchless	Vulcan	
Thickness of vein	13 ft.	11 ft.	5 to 5½	8 ft.	
Kind of opening	Slope	Slope	Shaft	Shaft	
Character of coal	Lignite	Lignite	Lignite	Lignite	Total Tonnage
January	.....	.....	.....	.....	97,727
February	.....	.....	.....	.....	83,728
March	.....	.....	.....	.....	70,692
April	.....	.....	.....	.....	60,956
May	.....	.....	.....	.....	29,733
June	.....	.....	.....	.....	24,273
July	.....	.....	.....	.....	32,479
August	.....	.....	.....	.....	40,150
September	.....	.....	.....	.....	68,468
October	.....	.....	.....	.....	81,019
November	.....	.....	.....	.....	22,505
December	10,000	8,400	6,000	801	208,898
Totals	10,000	8,400	6,000	801	820,628

PRODUCTION OF DELTA COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Juanita	
Thickness of vein	4½ ft.	
Kind of opening	Drift	
Character of coal	Bituminous	
December	6,000	Total Tonnage
Yearly report	6,000	6,000

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Curtis	Rapson No. 2	Broadside Danville
Thickness of vein	17 ft.	8 ft	12 ft
Kind of opening	Shaft	Shaft	Slope
Character of coal	Lignite	Lignite	Lignite
January	9,223	6,841	3,652
February	7,883	4,881	2,467
March	6,444	1,658	1,750
April	5,496	625	946
May	5,067	555	700
June	5,007	732	691
July	4,503	394	774
August	5,856	356	1,337
September	6,829	1,335	2,101
October	1,804	563	235
November	6,461	2,407	1,031
December	9,041	4,272	5,200
Totals	73,614	24,619	20,884

EL PASO COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Pikeview 8 ft. Shaft Lignite	Austin Bluffs 8 ft. Shaft Lignite	Tudor 5 ft. Slope Lignite	Williamsville 6 to 12 ft. Slope Lignite	Total Tonnage
7,323	3,400	.....	.....	30,439
7,800	3,900	.....	.....	26,931
3,111	2,450	.....	.....	15,413
2,921	1,675	.....	.....	11,663
4,570	554	.....	.....	11,446
4,826	825	.....	.....	12,081
3,106	365	.....	.....	9,142
5,838	530	.....	.....	13,917
4,755	1,721	.....	.....	16,741
1,799	390	.....	.....	4,791
3,628	1,194	.....	.....	14,721
8,100	1,971	8,448	7,150	44,182
57,777	18,975	8,448	7,150	211,467

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Brookside	Rockvale	Coal Creek
Thickness of vein	5½ to 6 ft	3½ ft.	3 to 5 ft.
Kind of opening	Slope	Shaft	Slope
Character of coal	Semi-Bituminous	Semi-Bituminous	Semi-Bituminous
January	21,381	23,911	9 145
February	18,705	20,303	9,374
March	18,499	21,401	9,807
April	14,086	16,891	5,720
May	15,658	23,081	8,382
June	14,668	22,504	8,439
July	19,963	21,444	8,093
August	12,751	21,007	8,875
September	11 226	19,822	8,99[illegible]
October	11,507	21,911	8,706
November	2,429	4,739	1,890
December	Strike	Strike	Strike
Totals	160,873	217,014	87,427

FREMONT COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Fremont	Chandler	Magnet	Peanut	Williams	Bluff Springs
4½ ft.	5 to 6 ft.	4½ ft.	4 ft. 3 in.	2 ft.	3 ft.
Shaft	Shaft	Slope	Shaft	Slope	Slope
Semi-	Semi-	Semi-	Semi-	Semi-	Semi-
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
10,233	6,605	2,800	.....	.....	.....
9,924	5,384	3,246	.....	.....	.....
10,302	6,151	3,000	.....	.....	.....
7,919	4,725	1,200	.....	.....	.....
9,889	4,719	2,934	.....	.....	.....
10,120	4,309	2,870	.....	.....	.....
9,341	4,492	1,679	.....	.....	.....
8,947	4,854	1,357	.....	.....	.....
9,262	5,950	Closed	.....	.....	.....
10,106	6,941	1,612	.....	.....	.....
2,407	3,290	410	.....	.....	.....
Strike	3,770	150	4,850	700	7,234
98,450	61,190	21,258	4,850	700	7,234

PRODUCTION OF FREMONT COUNTY, 1903.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine.....	Williamsburg	Royal Gorge	Diamond	Cuckoo Four veins run	
Thickness of vein	2 ft. 4 in.	3½ to 4 ft.	3½ ft.	3 to 5 ft.	
Kind of opening..	Slope	Slope	Slope	Shaft	
Character of coal	Semi-Bituminous	Semi-Bituminous	Semi-Bitum.	Semi-Bitum.	Total Tonnage
January.....	.....	.....	.....	.....	74,075
February.....	.....	.....	.....	.....	66,936
March.....	.....	.....	.....	.....	69,160
April.....	.....	.....	.....	.....	50,541
May.....	.....	.....	.....	.....	64,663
June.....	.....	.....	.....	.....	62,910
July.....	.....	.....	.....	.....	65,012
August.....	.....	.....	.....	.....	57,791
September.....	.....	.....	.....	.....	55,256
October.....	.....	.....	.....	.....	60,783
November.....	.....	.....	.....	.....	15,165
December.....	95	9,500	740	589	27,628
Totals.....	95	9,500	740	589	669,920

PRODUCTION OF GARFIELD COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Coryell	Sunlight	Pocahontas	Midland	South Canon	
Thickness of vein	15 ft.	9 ft.	7 ft.	6 to 7 ft.	3 to 20 ft.	
Kind of opening	Drift	Slope	Drift	Drift	Drift	
Character of coal	Bituminous	Semi-Bituminous	Bituminous	Bituminous	Bituminous	Total Tonnage
January	4,505	4,875	4,400	6,570	New	20,350
February	3,905	3,196	Idle	4,116	mine	11,217
March	6,128	4,777	Idle	295	.....	11,200
April	6,042	1,384	Idle	Closed	.....	7,426
May	5,782	3,389	Idle	Closed	.....	9,171
June	4,946	Idle	Idle	1,850	900	7,696
July	2,840	Idle	Idle	2,193	1,585	6,618
August	4,732	Idle	3,501	3,252	1,475	12,960
September	3,786	Idle	3,684	4,290	2,330	14,090
October	4,537	Idle	4,962	2,415	3,000	14,914
November	1,454	Idle	1,413	1,942	1,000	5,809
December	25	Idle	Strike	1,416	4,500	5,941
Totals	48,682	17,621	17,960	28,339	14,790	127,392

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Crested Butte
Thickness of vein	10 ft.
Kind of opening	Slope
Character of coal	Bituminous
January	17,826
February	17,773
March	18,538
April	18,614
May	20,602
June	18,662
July	15,981
August	14,966
September	18,692
October	15,470
November	18,479
December	17,126
Totals	212,729

GUNNISON COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Anthracite	Floresta	Alpine	Somerset	
4 ft.	3 ft.	6 ft.	9 ft.	
Drift	Drift	Shaft	Slope	
Anthracite	Anthracite	Semi-Bituminous	Bituminous	Total Tonnage
3,053	Idle	10,061	882	31,772
2,261	Idle	4,001	2,230	26,265
2,785	Idle	2,824	5,909	30,056
1,738	Idle	2,420	4,294	27,066
Worked	2,175	6,586	9,718	39,081
out	6,007	7,361	12,373	44,403
.....	5,580	9,166	14,091	44,818
.....	6,056	9,174	10,656	40,852
.....	6,899	9,418	13,793	48,802
.....	6,961	10,605	10,367	43,403
.....	2,382	10,043	5,653	36,557
.....	3,067	9,358	10,836	40,387
9,837	39,127	91,017	100,752	453,462

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Pictou	Robinson	Walson
Thickness of vein	3½ and 4½ 5 ft. 8 in.	6 to 8 ft.	5 to 8 ft.
Kind of opening	Slope	Slope	Slope
Character of coal	Bituminous	Bituminous	Bituminous
January	17,221	12,198	15,294
February	15,079	11,133	13,891
March	15,705	12,164	15,785
April	14,184	11,063	14,163
May	14,249	12,924	16,367
June	12,527	12,396	15,661
July	11,016	12,925	14,051
August	10,789	12,950	14,353
September	10,667	13,880	14,459
October	12,270	16,025	15,372
November	4,009	6,098	7,064
December	3,322	8,434	9,960
Totals	141,038	142,190	166,420

HUERFANO COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Rouse No. 4	Hezron	Maitland	Sunshine	Pryor	Champion
6 to 6½ ft.	3 to 5 ft. 4 in.	3 to 5 ft.	5 to 6 ft.	4, 5 and 6½ ft.	4, 5 & 6 ft.
Slope	Slope and Drift	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
16,381	12,580	9,413	2,079	11,050	5,087
15,320	11,679	8,356	2,114	9,898	4,247
18,702	13,028	9,065	2,587	8,886	3,550
14,531	11,531	6,228	1,431	6,034	2,417
18,846	11,940	7,215	1,408	7,485	2,555
19,331	11,915	7,513	1,580	6,458	2,862
19,882	10,711	7,488	1,538	6,873	2,790
18,838	11,585	6,144	1,801	7,821	2,454
21,400	12,177	8,585	1,701	8,064	2,688
19,767	12,529	9,412	1,822	8,012	4,026
4,944	4,520	3,162	532	1,679	1,350
124	3,231	2,085	206	2,580	1,401
188,066	127,426	84,666	18,799	84,840	35,427

PRODUCTION OF HUERFANO COUNTY, 1903.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine.....	Toltec	Midway	Rugby	
Thickness of vein...	1½ ft.	4 to 6 ft.	3 ft. 8 in. to 4 ft. 6 in.	
Kind of opening....	Slope	Slope	Slope	
Character of coal..	Bituminous	Bituminous	Bituminous	Total Tonnage
January	5,473	12,608	11,873	131,257
February	3,517	10,520	9,819	115,573
March	4,106	10,275	9,358	123,211
April	2,561	6,204	7,968	98,315
May	2,520	10,994	10,803	117,306
June	2,201	11,950	10,110	114,504
July	2,325	11,269	8,073	108,941
August	3,648	9,564	8,203	108,150
September	3,720	10,771	Strike	108,112
October	4,211	10,932	Strike	114,378
November	768	2,612	Strike	36,738
December	1,109	2,540	277	35,269
Totals	36,159	110,239	76,484	1,211,754

PRODUCTION OF JEFFERSON COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Leyden	
Thickness of vein	9 ft.	
Kind of opening	Shaft	
Character of coal	Lignite	
January	New	
February	mine	Total Tonnage
March	50	50
April	75	75
May	60	60
June	748	748
July	1,750	1,750
August	2,400	2,400
September	3,900	3,900
October	5,058	5,058
November	1,331	1,331
December	1,331	1,331
Totals	16,703	16,703

PRODUCTION OF LARIMER COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Indian Springs	
Thickness of vein	5 to 8 ft.	
Kind of opening	Slope	
Character of coal	Lignite	Total Tonnage
December	1,000	.....
Yearly report	1,000	1,000

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine.....	Primero	Starkville	Sopris	Engle
Thickness of vein....	7 ft.	7 ft.	3½ to 4 ft.	5½ to 7 ft.
Kind of opening	Drift	Drift	Drift	Drift.
Character of coal...	Bituminous	Bituminous	Bituminous	Bituminous
January	70,757	32,437	13,006	12,274
February	60,752	25,786	12,281	11,490
March	66,141	30,799	12,871	14,926
April	66,112	32,721	13,068	23,850
May	66,343	35,415	13,813	24,915
June	62,456	30,898	12,001	26,156
July	62,291	32,812	13,726	26,645
August	55,079	31,191	14,679	25,325
September	56,942	32,944	13,128	29,199
October	51,104	35,940	15,378	30,447
November	24,455	8,687	3,465	6,604
December	25,017	Strike	Strike	Strike
Totals	667,449	329,630	137,416	231,831

LAS ANIMAS COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Berwind	Tobasco	Tercio	Hastings	Hastings	Hastings
5½ ft.	5 to 5½ ft.	5 to 6¼ ft.	No. 1 6 to 8 ft.	No. 2 6 to 8 ft.	No. 3 6 to 8 ft.
Drift	Slope	Drift	Drift	Slope	Drift
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
31,079	11,230	15,699	14,386	26,450	8,255
28,734	10,043	14,756	21,416	40,617	13,682
32,931	11,448	15,790	13,710	26,533	6,228
32,760	12,557	18,102	14,998	21,442	Closed
37,745	12,476	16,806	14,319	19,217	Closed
32,130	11,495	13,523	5,110	21,552	Closed
35,670	12,849	11,570	11,552	27,096	Closed
37,472	11,799	11,900	12,592	35,483	3,234
40,089	12,296	11,128	12,717	38,527	3,625
40,329	11,759	8,722	12,717	38,527	3,625
8,350	2,562	4,078	3,556	7,630	1,819
Strike	Strike	5,110	2,329	Strike	Strike
357,289	120,514	147,184	139,402	303,074	40,468

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine.....	Gray Creek	Delagua No. 5	Delagua No. 6	Delagua No. 7
Thickness of vein....	6 to 9 ft.	6 to 8 ft.	6 to 8 ft.	6 to 7 ft.
Kind of opening.....	Drift	Drift	Slope	Drift
Character of coal...	Bituminous	Bituminous	Bituminous	Bituminous
January	20,590	2,784	2,167	462
February	18,578	3,591	1,930	1,311
March	17,544	5,244	2,803	2,511
April	18,242	4,909	2,603	2,539
May	19,048	6,701	1,539	2,638
June	18,414	3,719	803	1,481
July	17,958	7,922	1,970	3,138
August	19,564	5,404	309	3,399
September	19,435	12,063	1,509	4,070
October	21,182	12,938	3,547	4,963
November	4,528	6,285	1,074	1,753
December	1,067	8,646	3,587	2,479
Totals	196,150	80,206	23,841	30,744

LAS ANIMAS COUNTY, 1903—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Bowen	Majestic	Bloom	Broadhead	La Belle	Primrose
9 ft.	5½ to 9 ft.	7 ft.	4 ft.	5 ft.	4 ft.
Drift	Drift	Drift	Slope	Drift	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
13,937	14,821	3,264	11,410	4,900	10,209
12,476	20,420	2,701	10,875	4,800	9,216
14,111	21,141	2,228	8,310	4,700	5,591
12,547	17,886	1,318	4,335	3,400	6,378
13,700	20,140	1,123	8,650	3,500	7,370
14,014	16,621	834	7,680	3,300	11,620
10,093	17,307	1,700	9,202	2,700	12,320
14,375	4,000	2,236	11,390	2,565	13,820
13,192	4,017	3,019	9,340	2,700	12,503
14,500	11,000	3,276	8,675	3,400	10,665
2,800	3,742	3,042	4,575	1,200	1,717
Strike	6,531	2,203	8,385	Strike	Strike
135,745	157,626	26,944	102,827	37,165	101,409

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Forbes No. 2	Green Canon	Ludlow	Rapson No. 1
Thickness of vein	4 ft.	4 to 5 ft.	5½ to 7 ft.	4 ft.
Kind of opening	Drift	Drift	Drift	Slope
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous
January	1,900	New mine	New mine	719
February	1,400	1,234	New mine	547
March	2,100	2,170	2,000	Idle
April	2,100	3,140	2,000	Idle
May	2,300	2,436	2,000	Idle
June	1,564	1,388	2,974	Idle
July	2,046	2,348	3,108	Idle
August	2,631	1,248	3,508	Idle
September	1,500	1,847	3,787	Idle
October	2,100	1,213	Strike	584
November	676	532	Strike	Strike
December	Strike	Strike	Strike	Strike
Totals	20,317	17,556	19,377	1,850

LAS ANIMAS COUNTY, 1903—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Butler	Jewel	Cuatro	Piedmont	Southwestern	Greenville
5 to 7 ft.	4 ft.	4 to 10 ft.	4½ to 5 ft.	4 ft. 5 in.	5½ to 6 ft.
Drift	Drift	Drift	Slope	Slope	Drift
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
1,290	913	.....	.....	.....	.....
1,042	554	.....	.....	.....	.....
842	Closed	.....	.....	.....	.....
703	Closed	.....	.....	.....	.....
1,000	515	New mine	.....	.....	.....
1,000	Closed	2,162	.....	.....	.....
1,000	Closed	3,200	New mine	.....	.....
623	Closed	3,285	2,300	.....	.....
Worked out	448	2,766	4,489	.....	.....
.....	241	569	2,357	.....	.....
.....	Strike	Strike	Strike	.....	New mine
.....	Strike	Strike	Strike	13,789	4,056
7,500	2,671	11,982	9,146	13,789	4,056

PRODUCTION OF LAS ANIMAS COUNTY, 1903.—Concluded.

Name of mine	Black Diamond	Wootten	
Thickness of vein	3½ to 4 ft.	4 to 5 ft.	
Kind of opening	Slope	Drift	
Character of coal	Bituminous	Bituminous	Total Tonnage
January	3,492	.....	328,431
February	3,859	.....	334,091
March	2,200	.....	324,872
April	2,215	.....	319,925
May	2,412	.....	336,121
June	5,470	.....	308,365
July	5,470	.....	335,693
August	5,400	.....	334,811
September	5,842	.....	353,122
October	5,470	.....	355,228
November	5,170	.....	108,300
December	2,500	3,697	89,396
Totals	49,500	3,697	3,528,355

PRODUCTION OF LA PLATA COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Porter	Hesperus	Ute	City	Champion	Perin's Peak	
Thickness of vein	2½ to 4 ft.	5½ ft.	5 to 6 ft.	2½ to 3½ ft.	3 to 4 ft.	7 ft.	
Kind of opening	Drift	Drift	Drift	Drift	Drift	Drift	
Character of coal	Bituminous	Semi-Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Total Tonnage
January	4,777	3,102	856	2,406	2,329	2,451	15,921
February	3,400	2,101	931	2,200	1,466	1,536	11,634
March	3,185	1,985	554	2,442	677	1,932	10,775
April	3,449	2,113	588	1,652	850	878	9,530
May	3,464	2,197	555	1,709	1,449	1,450	10,824
June	3,669	1,693	415	1,525	1,620	709	9,031
July	4,249	1,534	598	1,837	1,541	475	10,234
August	3,634	1,710	518	1,165	1,525	1,106	9,658
September	4,041	1,997	552	958	1,522	1,200	10,270
October	5,888	2,266	723	1,612	1,221	1,553	13,263
November	5,883	2,730	679	2,055	1,236	2,400	14,983
December	5,477	2,665	700	2,154	1,476	2,400	14,872
Totals	50,516	26,093	7,669	21,715	16,912	18,090	140,995

PRODUCTION OF MESA COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Book Cliff	Cameo	Stokes	Palisade	
Thickness of vein	5 ft.	6 ft.	3½ ft.	4 ft.	
Kind of opening	Drift	Drift	Drift	Drift	
Character of coal	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.	Total Tonnage
December	2,051	3,686	2,200	13,884	21,821
Yearly report	2,051	3,686	2,200	13,884	21,821

PRODUCTION OF MONTEZUMA COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Mancos	
Thickness of vein	2½ ft.	
Kind of opening	Drift	
Character of coal	Lignite	Total Tonnage
December	450	450
Yearly report	450	450

PRODUCTION OF PITKIN COUNTY, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Spring Gulch	Coal Basin	
Thickness of vein	10 ft.	7 to 10 ft.	
Kind of opening	Slope	Slope	
Character of coal	Bituminous	Bituminous	Total Tonnage
January	18,428	14,126	32,554
February	20,904	9,316	30,220
March	20,200	19,910	40,110
April	17,813	14,114	31,927
May	20,079	17,076	37,155
June	15,518	17,496	33,014
July	14,110	14,551	28,661
August	14,701	10,602	25,303
September	14,043	7,242	21,285
October	18,500	12,779	31,279
November	Strike	14,073	14,073
December	Strike	11,595	11,595
Totals	174,296	162,889	337,176

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Garfield	Lehigh	White House
Thickness of vein	5 ft. 10 in.	5½ ft.	2 veins 6 ft.
Kind of opening	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite
January	3,869	1,896	.....
February	3,023	1,853	.....
March	5,853	2,278	.....
April	2,405	2,726	.....
May	2,326	2,352	.....
June	1,195	2,376	.....
July	1,276	3,530	.....
August	1,864	3,401	.....
September	5,307	2,502	.....
October	4,342	3,438	.....
November	697	1,600	.....
December	3,500	5,569	9,156
Totals	35,653	33,521	9,156

WELD COUNTY, 1903.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Reliance	Emerson	Washington	Davies	Eureka	
4½ ft.	3½ ft.	5 ft.	5 ft.	5 to 6 ft.	
Shaft	Shaft	Shaft	Shaft	Shaft	
Lignite	Lignite	Lignite	Lignite	Lignite	Total Tonnage
.....	.....	.....	.....	.....	5,765
.....	.....	.....	.....	.....	4,876
.....	.....	.....	.....	.....	8,131
.....	.....	.....	.....	.....	5,131
.....	.....	.....	.....	.....	4,678
.....	.....	.....	.....	.....	3,571
.....	.....	.....	.....	.....	4,802
.....	.....	.....	.....	.....	5,265
.....	.....	.....	.....	.....	7,809
.....	.....	.....	.....	.....	7,780
.....	.....	.....	.....	.....	2,297
604	1,763	3,750	6,000	7,732	38,074
604	1,763	3,750	6,000	7,732	98,179

PRODUCTION OF THE STATE OF COLORADO, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Boulder	Delta	El Paso	Fremont
January	97,727	.....	30,439	74,075
February	83,728	.....	26,931	66,936
March	70,692	.....	15,413	69,160
April	60,956	.....	11,663	50,541
May	29,733	.....	11,446	64,663
June	24,273	.....	12,081	62,910
July	32,479	.....	9,142	65,012
August	40,150	.....	13,917	57,791
September	68,468	.....	16,741	55,256
October	81,019	.....	4,791	60,783
November	22,505	.....	14,721	15,165
December	208,898	6,000	44,182	27,628
Totals	820,628	6,000	211,467	669,920

PRODUCTION OF THE STATE OF COLORADO, 1903. —Continued.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Garfield	Gunnison	Huerfano	Jefferson
January	20,350	31,772	131,257	.....
February	11,217	26,265	115,573	.....
March	11,200	30,056	123,211	50
April	7,426	27,066	98,315	75
May	9,171	39,081	117,306	60
June	4,696	44,403	114,504	748
July	6,618	44,818	108,941	1,750
August	12,960	40,852	108,150	2,400
September	14,090	48,802	108,112	3,900
October	14,914	43,403	114,378	5,058
November	5,809	36,557	36,738	1,331
December	5,941	40,387	35,269	1,331
Totals	127,392	453,462	1,211,754	16,703

PRODUCTION OF THE STATE OF COLORADO, 1903. —Continued.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Larimer	Las Animas	La Plata	Mesa
January	.....	328,431	15,921	.....
February	.....	334,091	11,634	.....
March	.....	324,872	10,775	.....
April	.....	319,925	9,530	.....
May	.....	336,121	10,824	.....
June	.....	308,365	9,031	.....
July	.....	335,693	10,234	.....
August	.....	334,811	9,658	.....
September	.....	353,122	10,270	.....
October	.....	355,228	13,263	.....
November	.....	108,300	14,983	.....
December	1,000	89,396	14,872	21,821
Totals	1,000	3,528,355	140,995	21,821

PRODUCTION OF THE STATE OF COLORADO, 1903. —Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Montezuma	Pitkin	Weld	Total Tonnage
January		32,554	5,765	768,291
February		30,220	4,876	711,471
March		40,110	8,131	703,670
April		31,927	5,131	622,555
May		37,155	4,678	660,238
June		33,014	3,571	620,596
July		28,661	4,802	648,150
August		25,303	5,265	651,257
September		21,285	7,809	707,855
October		31,279	7,780	731,896
November		14,073	2,297	272,479
December	450	11,595	38,074	546,844
Totals	450	337,176	98,179	7,645,302

PRODUCTION BY COUNTIES,

SHOWING INCREASE AND DECREASE.

Counties	1902	1903	Increase	Decrease
Boulder	811,822	820,628	8,806	.....
Delta	.....	6,000	6,000	.....
El Paso	183,871	211,467	27,596	.....
Fremont	710,306	669,920	.....	40,386
Garfield	165,353	127,392	.....	37,961
Gunnison	393,155	453,462	60,307	.....
Huerfano	1,114,939	1,211,754	96,815	.....
Jefferson	.....	16,703	16,703	.....
Larimer	.....	1,000	1,000	.....
La Plata	136,178	140,995	4,817	.....
Las Animas	3,418,209	3,528,355	110,146	.....
Mesa	26,123	21,821	.....	4,302
Montezuma	.....	450	450	.....
Pitkin	413,090	337,176	.....	75,914
Weld	59,877	98,179	38,302	.....
Small mines not reporting production, estimated	90,000	130,000	40,000	.....
Total tonnage	7,522,923	7,775,302	.....	.....

Increase for 1903, 252,379 tons.

PRODUCTION OF THE STATE OF COLORADO, 1903.

SHOWING MONTHLY AND YEARLY PRODUCTION OF THE DIFFERENT VARIETIES

Months	Lignite	Semi-Bituminous	Bituminous	Anthracite	Total Tonnage
January	133,931	92,113	539,194	3,053	768,291
February	115,534	76,234	517,442	2,261	711,471
March	94,287	78,746	527,852	2,785	703,670
April	77,825	56,458	486,534	1,738	622,555
May	45,917	76,835	535,311	2,175	660,238
June	40,673	71,964	501,952	6,007	620,596
July	48,173	75,712	518,685	5,580	648,150
August	61,732	68,675	514,794	6,056	651,257
September	96,918	66,671	537,367	6,899	707,855
October	98,648	73,654	552,633	6,961	731,896
November	40,854	27,938	201,305	2,382	272,479
December	321,756	61,472	160,549	3,067	546,844
Totals	1,176,248	826,472	5,593,618	48,964	7,645,302
Unclassified coal...	.....	.....	.....	.....	130,000
Total	.....	.....	.....	.....	7,775,302

TABLE

SHOWING THE TOTAL PRODUCTION OF DIFFERENT COMPANIES OPERATING TWO OR MORE MINES, FOR THE YEAR 1903.

Name of Company	—Character of Coal and Number of Mines— No. of Mines	Bituminous or Coking	No. of Mines	Semi-Bituminous or Non-Coking	No of Mines	Anthracite	No. of Mines	Lignite	Total in tons of 2,000 lbs.
Colorado Fuel & Iron Co.	16	3,318,340	5	581,385	2	48,964	..	.....	3,948,689
Victor Fuel Co.	7	919,350	1	61,190	..	.....	..	.....	980,540
Northern Coal & Coke Co.	3	62,619	..	.....	..	.....	9	612,458	675,077
Continental Fuel Co.	1	157,626	1	91,017	..	.....	1	34,613	283,256
Union Coal & Coke Co.	3	256,012	..	.....	..	.....	..	.....	256,012
Rocky Mountain Fuel Co.	4	92,610	1	21,258	..	.....	2	1,577	115,445
Pike's Peak Coal Co.	..	.....	..	.....	..	.....	2	78,661	78,661
Porter Fuel Co.	1	50,516	1	26,093	..	.....	..	.....	76,609
Cedar Hill Coal & Coke Co.	2	53,556	1	3,686	..	.....	..	.....	57,242
Gold King Consolidated Mines Co.	2	38,627	..	.....	..	.....	..	.....	38,627
Kirkmeyer Bros.	..	.....	..	.....	..	.....	2	14,400	14,400
Rapson Coal Co.	1	1,850	..	.....	..	.....	1	24,619	26,469
Wooley & Son	..	.....	..	.....	..	.....	2	9,760	9,760
S. P. Smith & Sons	..	.....	..	4,945	..	.....	..	.....	4,945

COKE PRODUCTION, 1903.

COKE PRODUCTION, 1903.

Name of Operator	Location of ovens	County	No. of ovens	Tonnage
Colorado Fuel & Iron Co.	Cardiff	Garfield	166	49,777
Colorado Fuel & Iron Co.	Crested Butte	Gunnison	154	57,485
Colorado Fuel & Iron Co.	Segundo	Las Animas	800	205,306
Colorado Fuel & Iron Co.	Starkville	Las Animas	190	47,915
Colorado Fuel & Iron Co.	El Moro	Las Animas	238	83,835
Colorado Fuel & Iron Co.	Sopris	Las Animas	272	99,193
Colorado Fuel & Iron Co.	Tercio	Las Animas	600	35,681
Colorado Fuel & Iron Co.	Tobasco	Las Animas	302	69,182
Colorado Fuel & Iron Co.	Redstone	Pitkin	249	40,299
Victor Fuel Co.	Hastings	Las Animas	128	42,900
Victor Fuel Co.	Gray Creek	Las Animas	100	37,378
American Smelting & Refining Co.	Durango	La Plata	34	9,287
			3,233	778,238

REMARKS.

The Cardiff ovens are supplied by Spring Gulch mines.
The El Moro ovens are supplied by the Engle mine.
The Redstone ovens are supplied by the Coal Basin mine.
The Segundo ovens are supplied by the Primero mine.
The Durango ovens are supplied by the Porter mine.

COKE PRODUCTION, 1903.

COKE PRODUCTION, 1903, BY COMPANIES AND COUNTIES.

Companies	Total Number of Ovens	Total Tonnage
Colorado Fuel & Iron Company	2,971	688,673
Victor Fuel Company	228	80,278
American Smelting and Refining Company	34	9,287
Totals	3,233	778,238

Counties	Number of Ovens	Tonnage
Las Animas	2,630	621,390
Garfield	136	49,777
Gunnison	154	57,485
Pitkin	249	40,299
La Plata	34	9,287
Totals	3,233	778,238

List of Fatal Accidents for 1903.

FATAL ACCIDENTS IN 1903.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Married or Single	Name of Mine	County	Cause of Accident
Jan. 7	Tony Bonato	Italian	Rock dumper	22	Single	Starkville	Las Animas	Fall of rock
Jan. 17	Samuel Heard	American	Motor man	27	Married	Starkville	Las Animas	Fall of timber
Jan. 24	Emelia Freit	Austrian	Miner	40	Single	Hastings No. 1	Las Animas	Fall of rock
Jan. 28	Clyde Belcher	American	Miner	16	Single	Primrose	Las Animas	Fall of rock
Feb. 1	Angelo Ressi Mariano	Austrian	Miner	34	Married	Starkville	Las Animas	Electrocuted by live wire
Feb. 11	August Bonena	Italian	Miner	25	Single	Primero	Las Animas	Fall of coal
Feb. 11	Guiseppi Banaletti	Italian	Miner	38	Married	Primero	Las Animas	Fall of coal
Feb. 16	John Petre	Italian	Miner	38	Married	Primero	Las Animas	Fall of slate
Feb. 25	Robert Kyle	American	Miner	29	Married	Maitland	Huerfano	By mine cars
Feb. 26	Mike Delamo	Italian	Miner	15	Single	Rex No. 1	Boulder	Fall of rock
Feb. 26	George Phillips	American	Driver	27	Married	Starkville	Las Animas	Fall of rock
Feb. 28	John P. James	American	Miner	34	Married	Black Diamond	Las Animas	Fall of rock
Mar. 3	Daniel Romero	Mexican	Miner	23	Single	Midway	Huerfano	Fall of rock
Mar. 11	Dominick Ferrari	Austrian	Miner	42	Married	Berwind	Las Animas	Fall of draw slate
Mar. 14	Dominic Perrino	Italian	Miner	39	Married	Rockvale	Fremont	Fall of coal
Mar. 27	Emilio Abrams	Austrian	Miner	21	Single	Sopris	Las Animas	Fall of draw slate
April 13	Pete Shubal	Slav	Miner	30	Married	Walsen	Huerfano	Fall of roof
April 27	Guiseppi Barro	Italian	Miner	49	Married	Sunshine	Huerfano	Fall of roof

April 29	Torri Salvator	Italian	Miner	20	Single	Primero	Las Animas	Fall of coal
May 16	Robert Stevenson	Scotch	Miner	46	Not known	Sopris	Las Animas	Fall of rock
May 18	Battista Montomome	Italian	Miner	36	Single	Hezron	Huerfano	Fall of rock (pot)
June 23	John Robertson	Scotch	Timberman	44	Married	Maitland	Huerfano	By mine car
June 25	Joseph San Felipe	Italian	Miner	34	Single	Hastings No. 2	Las Animas	Fall of roof
June 26	Wm. Kallar	Austrian	Rock miner	31	Single	Crested Butte	Gunnison	Fall of rock
July 7	Joseph Supanich	Austrian	Miner	28	Single	Floresta	Gunnison	By an explosion of powder
July 11	Bregida Duran	Mexican	Miner	43	Married	Rouse	Huerfano	Fall of slate
July 21	Francisco Patti	Italian	Miner	29	Married	Berwind	Las Animas	Fall of top coal
July 23	Richard Hunter	Scotch	Mule driver	25	Single	Brodhead	Las Animas	Fall of rock
July 23	Martin Budda	Hungarian	Miner	34	Married	Pryor	Huerfano	Fall of rock
July 28	John Rua	Italian	Miner	32	Not known	Walsen	Huerfano	Missed shot
Sept. 10	Candida Bartinola	Austrian	Miner	22	Single	Sopris	Las Animas	Fall of rock
Sept. 10	David Prince	American	Miner	18	Single	Primrose	Las Animas	Fall of roof and coal
Sept. 23	John Mattilina	Italian	Miner	25	Single	Wooten	Las Animas	Fall of rock
Oct. 13	Elario Agosti	Austrian	Company hand	27	Single	Rouse	Huerfano	Fall of coal
Oct. 22	Mike Duchak	Austrian	Miner	55	Married	Primrose	Las Animas	Fall of rock
Oct. 31	Mathew Laughran	Irish	Miner	42	Married	Magnet	Fremont	Premature shot
Nov. 11	Tony Zullo	Italian	Shot lighter	32	Married	Coryell	Garfield	Dust explosion
Dec. 8	Joe Brodrac	Austrian	Miner	25	Married	Book Cliff	Mesa	Premature shot
Dec. 18	John Herbeck	Austrian	Miner	35	Married	Simpson	Boulder	Fall of top coal
Dec. 23	Alexander Smiley	American	Miner	44	Married	Brodhead	Las Animas	Fall of rock

FATAL ACCIDENTS IN 1903.—Concluded.

SURFACE.

Date	Name of Person	Nationality	Occupation	Age	Married or Single	Name of Mine	County	Cause of Accident
Jan. 20	Manuel Martinez	Mexican	Dumper	29	Married	Chandler	Fremont	Falling down shaft
Jan. 23	George Collier	Welsh	Nipper	17	Single	Primero	Las Animas	Run over by cars
Oct. 1	James McGinnis	American	Miner	40	Married	Leyden	Jefferson	Falling down shaft
Dec. 21	Jay C. Gould	American	Coal dumper	34	Married	Coalbasin	Pitkin	By run-a-way cars

REPORT OF THE ACCIDENT AT THE CORYELL MINE, WHICH OCCURRED NOVEMBER 11, 1903.

At 5:15 p. m. on the above said date a dust explosion, originating from a shot fired in the coal, occurred at the Coryell mine, causing the death of Tony Zullo, and also doing much damage to the property. The mine is operated by The Garfield County Coal & Fuel Co., and is located 500 feet above the base on the side of the mountain, forming the south side of the Grand river valley, and about three-fourths of a mile east of the town of Newcastle on the line of the Midland railroad, with which it is connected by a 38-degree gravity plane 400 feet in length. The measures lie at an angle of 47 degrees with the horizontal dipping into the mountain, almost forming a right angle with the slope of the hill. The line of strike diverting slightly south of east and northwest and approximately paralleling the valley at this point. Commencing at the bottom of this series, the "Allen vein" is the fourth workable in geological sequence, 15 feet thick, and of semi-bituminous character. The vein was reached by a cross-cut tunnel driven through its underlying measures, striking the coal at a level distance of 140 feet and a depth of 100 feet below the croppings. From this intersection, an east entry with a parallel air course and separated by a 15-foot pillar, were driven along the foot-wall for 2,197 feet, from which forty-nine rooms were turned, averaging 45 feet center to center apart and 100 feet in length, each terminating by its contact with the crop coal. Forty-three of these rooms had been worked out, the pillars partially extracted and abandoned. There were only six rooms and two entries in operation at the time of the explosion. From the terminus of every sixth or eighth room an opening was made to the surface, by the aid of which the air-circuit and friction were essentially reduced, besides being an exit for the men in case of an emergency. The ventilation was produced by an 8-foot fan, forcing the current down an air course, driven on the dip of the vein, and connecting with the main entry inside of a door a short distance from the rock tunnel. From here the air was conducted along the main entry to the face and running through the rooms to the outlet, which was then at the head of room No. 42.

On the 30th of October, twelve days previous to the accident, I made an inspection as to the safe and sanitary condition of the mine, and found the haulage-way, man-ways, cross-cuts and all the working places perfectly free from any danger of falls. Number of men employed inside, twenty-six; total quantity of air entering the mine was 10,497½ cubic feet per minute, which was judiciously conducted through the workings. I found even the most remote cavities, not directly in the path of the air-current, absolutely clear of any explosive gas (CH^4), and was informed that none had ever been detected in the mine. All the

coal is mined by blasting; 35 per cent. Hercules giant powder, which is supposed to be flameless, was used exclusively. Extended along the side of the main entry was a 1-inch pipe water line, one end of which was attached to a pump and water tank at the mouth of the mine, and the other reaching to within close proximity of the face. This pipe was fitted with plugs at intervals of 75 to 100 feet apart, and in addition to this, the shot-lighter was equipped with hose of sufficient length to sprinkle any desired part of the workings.

In a conspicuous place at the entrance of the mine were posted the following rules and instructions governing the duties of the shot-lighter:

(1st.) Seeing that air-ways are kept free from accumulations of coal in places which may interfere with the ventilation.

(2nd.) Keeping the mine properly sprinkled and free from accumulations of coal dust, especially in the air-ways and entries.

(3rd.) In properly wetting places when shots are to be fired.

(4th.) In inspecting all shots to see that the holes are properly drilled and loaded, and firing the same when in his judgment they are safe.

(5th.) He shall refuse to fire shots when one or more shots are dependent on one another, and when in his judgment any shot or shots are unsafe.

(6th.) He shall return immediately and inspect all places where shots have been fired, for the purpose of discovering any fire which may have been started by shots or other causes, and for the purpose of determining whether fire-damp has been liberated or accumulated after the shots have been fired.

(7th.) If he discovers fire-damp in any part of the works, he shall immediately notify the foreman of the mine.

In spite of all these provisions, the entire workings were very dry and dusty and the atmosphere, especially in the inner workings, was heavily charged with floating particles of this dangerous element, which showed that sprinkling had been neglected. When leaving the workings, I called the attention of the foreman, Dominic Zullo, brother of the shot-lighter, who was afterwards killed, to the great danger attending shot-firing in the presence of dust-laden atmosphere, and although we have no law compelling the watering of non-gaseous mines, I instructed him to remove the accumulations of dust that had been deposited on the sides of the roadway, and also to see that the necessary sprinkling was regularly attended to, as per rules, which demand he promised thereafter to comply with. I requested P. C. Coryell, superintendent, to add another rule instructing the shot-lighter to see that all men were out of the mine before firing commenced. This rule was inserted in my presence, and was as follows:

(8th.) No shots shall be fired in the mine for any purpose whatever during working hours when any one excepting the shot-firer is in the mine, but see to it that every one excepting himself is outside the mine before lighting any shots.

To this rule may be attributed the fact that not more lives were lost.

At the time of the explosion there were only four shots fired, two in the top coal of room 44 and two at the face of the upraise 49, which was close to the face of the entry. All shots, with the exception of 7 inches left at the back of the rib-hole in the upraise, did their work and removed the loads assigned them. Depth of the holes in room 44 were 5 and 6 feet, respectively, and one contained 7 and the other 8 sticks of powder, and charged by Rudolph Lorenzi and Ralph Rossa. Those of the upraise were 3½ and 4 feet in depth, containing three and four sticks, drilled and loaded by Dominic Fisco and Dominico Damaggio. The former two passed the shot-lighter at room 43 on their way out, and they were only a few yards out of the mine when the explosion occurred.

The force of the explosion was most terrific in its character. Nearly all the bulkheads from room 38 out were swept away, releasing thousands of tons of rock and coal that had accumulated above, and which, when liberated, rolled into the roadway in large quantities and almost blocked the entry opposite the mouth of each room. The fan with its foundation was hurled into fragments, and the ground around it was torn up and strewn over the mountain sides below.

Owing to the difference of elevation between the outlet and the mouth of the tunnel, a natural current set in, and as soon as the after-damp was removed, a rescuing party, consisting of Dominic Zullo and others, entered the mine. Deceased was lying on his back in a clear space on the entry between rooms 37 and 38. His hands and face were severely burned, and one side of his head was bruised, but the body was not badly mutilated. From the fact that all the shots had done their work so thoroughly and no damage done in their immediate vicinity, it would have been difficult to ascertain from them in which of the two rooms the explosion originated. But the evidence remaining to show the directions taken by the forces prove conclusively to my satisfaction that the second shot fired in room 44 was the initiative point. This shot was probably too heavily charged for the amount of work it had to cope with, as all the load assigned to it was completely displaced and thrown into the coal pile opposite. A blast of this nature creates intense heat and flame which are due to a part of the energy being exerted upon the atmosphere instead of in the coal. The floor and sides of the old workings connecting with room 44 by a cross-cut were naturally covered with a layer of coal dust at its highest degree of inflammability. A large proportion of this dust was undoubtedly set in motion by the first blast, and the second shot took advantage of

the inviting condition, carrying the explosion into the old workings, thence to the entry through rooms 38, 37 and 36, where the force was divided, one going towards the face and the other out through the entry, increasing its energy as it went and tearing everything in its path, leaving conspicuous marks of its outward course.

From room 38 in, with slight exceptions, the condition was normal. The evidences left to indicate that the force was inward from 37 were as follows:

As stated before, Zullo's body was lying between 37 and 38. His cap was found inside of 41. Between 40 and 41 the water pipe was cut in two and the inside portion carried away 10 feet from the other, with its end bent inwardly. The ladder of 43 was blown in 15 feet, and nearly all the props from 38 in for some distance had their outward side coated with thick clusters of coke.

I investigated the cause of the accident on the morning of November 14th, and although the air-current was entirely cut off from the inside workings, they were perfectly free from the slightest trace of fire-damp. The surface of the roadway was very dry and dusty, but by digging a few inches into the slack of the roadbed I found moisture.

The four miners whose names are herein given, upon being examined, testified that they had never seen any explosive gas in the mine, but stated that it was very dusty. Had the superintendent attended to his duty and enforced the rules which he himself had issued and which are herein embodied, the accident would have probably been avoided.

County Coroner, Dr. Clark, of Glenwood Springs, made an investigation as to the cause of the accident, but decided it unnecessary to hold an inquest.

Coal and Coke Production for 1904.

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Simpson	Mitchell	Gladstone	Hecla
Thickness of vein	14 ft.	14 ft.	12 ft.	14 ft.
Kind of opening	Shaft	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite	Lignite
January	21,170	6,660	1,770	6,772
February	14,745	4,804	1,750	5,726
March	15,137	2,672	1,036	3,847
April	11,326	1,916	524	2,636
May	15,537	2,573	733	Not pro-
June	8,632	2,156	623	ducing
July	11,334	3,459	718	.....
August	11,728	2,653	869	.....
September	10,488	3,014	873	2,195
October	23,478	5,937	1,858	4,286
November	22,707	6,457	2,035	4,291
December	18,000	5,500	1,500	5,000
Totals	184,282	47,801	14,289	34,753

BOULDER COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS—CONTINUED.

Rex No. 1	Rex No. 2	Gorham	Industrial	Acme	Monarch
6 to 10 ft.	6½ ft.	7 to 12 ft.	7 ft.	7 ft.	6 ft.
Shaft	Shaft	Shaft	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
8,226	8,207	5,069	7,482	Reopened	6,354
7,185	9,326	2,232	4,598	.....	7,131
5,461	5,560	Not pro-	3,433	300	6,582
5,421	4,964	ducing	2,611	420	5,880
3,822	3,526	.....	2,798	334	5,838
2,459	2,386	.....	2,317	2,160	4,195
3,190	4,465	.....	1,200	2,168	4,471
5,131	4,986	.....	3,456	2,777	None
6,052	6,243	1,198	4,831	4,173	6,990
6,905	7,483	3,898	4,668	4,163	8,190
7,645	6,640	3,986	4,245	6,272	8,572
7,500	5,900	4,000	6,000	7,282	8,500
68,997	69,686	20,383	47,639	30,049	72,703

PRODUCTION OF BOULDER

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine.....	Strathmore	Clark No 8	Sunnyside	Tynon
Thickness of vein....	12 ft.	8 ft.	4 ft.	4 to 5 ft.
Kind of opening.....	Shaft	Slope	Shaft	Shaft
Character of coal....	Lignite	Lignite	Lignite	Lignite
January	5,578	671	625	2,534
February	5,844	463	792	Closed
March	4,988	236	779	.....
April	3,366	214	1,154	.....
May	2,092	168	849	.....
June	1,403	73	499	.....
July	1,323	365	554	.....
August	1,353	96	396	.....
September	2,301	None	351	.....
October	3,399	26	132	.....
November	4,492	None	Not pro-	.....
December	6,800	60	ducing	.....
Totals	42,939	2,372	6,131	2,534

COUNTY, 1904—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Matchless	Fox	Storrs	Vulcan	Haywood	Vaughn
5 to 5½ ft.	8 ft.	5½ ft.	8 ft.	4 to 10 ft.	13 ft.
Shaft	Shaft	Shaft	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
1,798	.....	766	517	3,797	.....
2,977	.....	735	400	2,818	.....
4,137	.....	Closed	334	2,454	.....
3,157	.....	down	Closed	2,001	.....
2,444	.....	.....	down	382	.....
2,309	.....	.....	.....	1,150	.....
806	.....	.....	.....	1,410	.....
1,448	.....	.....	.....	2,000	.....
4,990	.....	.....	.....	2,060	.....
4,990	.....	.....	.....	2,205	.....
4,991	.....	.....	.....	2,953	.....
3,609	7,500	.....	.....	3,000	7,000
37,647	7,500	1,501	1,251	26,170	7,000

PRODUCTION OF BOULDER COUNTY, 1904.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Shanahan	Black Diamond	Rosser No. 7	Marfell	
Thickness of vein	11 ft.	11 ft.	5 to 6 ft.	12 ft.	
Kind of opening	Slope	Slope	Drift	Slope	
Character of coal	Lignite	Lignite	Lignite	Lignite	Total Tonnage
January	.....	.....	.....	.....	87,996
February	.....	.....	.....	.....	71,526
March	.....	.....	.....	.....	56,956
April	.....	.....	.....	.....	45,590
May	.....	.....	.....	.....	41,096
June	.....	.....	.....	.....	30,362
July	.....	.....	.....	.....	35,463
August	.....	.....	.....	.....	36,893
September	.....	.....	.....	.....	55,699
October	.....	.....	.....	.....	81,618
November	.....	.....	.....	.....	85,286
December	5,000	10,160	4,250	5,266	121,818
Totals	5,000	10,160	4,250	5,266	750,303

PRODUCTION OF DELTA COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Juanita	
Thickness of vein	4½ ft.	
Kind of opening	Drift	
Character of coal	Bituminous	Total Tonnage
January	2,042	2,042
February	1,670	1,670
March	841	841
April	766	766
May	493	493
June	574	574
July	441	441
August	413	413
September	713	713
October	920	920
November	955	955
December	1,000	1,000
Totals	10,828	10,828

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Curtis	Rapson No. 2	Danville
Thickness of vein	17 ft.	8 ft.	12 ft.
Kind of opening	Shaft	Shaft	Slope
Character of coal	Lignite	Lignite	Lignite
January	8,025	4,525	8,271
February	8,024	3,863	6,293
March	7,243	3,461	4,234
April	6,001	2,787	2,835
May	5,737	1,541	2,895
June	7,163	140	2,894
July	6,270	248	3,160
August	7,503	1,039	9,229
September	7,225	1,599	4,642
October	7,167	1,363	5,574
November	5,770	2,430	5,563
December	7,500	3,500	5,500
Totals	83,628	26,596	61,090

EL PASO COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Pikeview	Austin Bluffs	Williamsville	Tudor	Franceville	
8 ft.	8 ft.	6 to 12 ft.	5½ ft.	6 ft.	
Shaft	Shaft	Slope	Slope	Slope	
Lignite	Lignite	Lignite	Lignite	Lignite	Total Tonnage
7,522	1,676	149	.....	.....	30,368
4,699	1,277	1,990	.....	.....	26,146
4,507	1,003	877	.....	.....	21,325
5,134	692	610	.....	.....	18,059
5,033	417	385	.....	.....	16,008
4,946	340	257	.....	.....	15,740
4,248	287	183	.....	.....	14,396
3,742	416	219	.....	.....	22,148
2,532	579	748	.....	.....	17,325
4,068	804	1,010	.....	.....	19,986
3,721	1,082	1,186	.....	.....	19,452
4,000	1,400	1,200	6,250	800	30,150
54,152	9,973	8,814	6,250	800	251,303

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Brookside	Rockvale	Coal Creek
Thickness of vein	5½ to 6 ft.	3½ ft.	3 to 5 ft.
Kind of opening	Slope	Shaft	Slope
Character of coal	Semi-Bituminous	Semi-Bituminous	Semi-Bituminous
January	Strike	Strike	Strike
February	"	"	"
March	"	"	"
April	"	"	"
May	726	"	"
June	1,318	"	"
July	1,608	1,223	"
August	4,025	3,956	1,452
September	4,375	5,630	4,692
October	3,991	8,752	7,470
November	4,935	14,445	6,388
December	4,832	14,428	6,388
Totals	26,810	48,434	26,390

FREMONT COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Fremont	Nonac	Chandler	Magnet	Bluff Springs
4½ ft.	5 ft. 10 in.	5 to 6 ft.	4½ ft.	3 ft.
Shaft	Slope	Shaft	Slope	Slope
Semi-Bituminous	Semi-Bituminous	Semi-Bituminous	Semi-Bituminous	Semi-Bituminous
Strike	.....	3,109	Strike	1,150
58	.....	4,086	"	1,290
1,273	Re-opened	5,903	"	660
4,893	424	3,349	"	Idle
5,275	552	2,641	776	"
4,667	1,067	3,702	2,327	"
4,996	1,238	3,290	1,968	625
5,657	689	3,024	1,875	966
7,652	2,208	3,828	2,814	757
8,808	3,091	5,022	2,693	907
9,306	3,326	5,313	2,392	928
9,358	3,390	5,000	2,900	1,000
61,943	15,985	48,267	16,845	8,193

PRODUCTION OF FREMONT

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Royal Gorge	Cuckoo	Peanut
Thickness of vein	3½ to 4 ft.	3 to 5 ft.	4 ft. 3 in.
Kind of opening	Slope	Shaft	Shaft
Character of coal	Semi-Bituminous	Semi-Bituminous	Semi-Bituminous
January	2,111	558	.....
February	2,215	572	.....
March	838	405	.....
April	870	500	.....
May	820	537	.....
June	1,142	503	.....
July	1,055	481	.....
August	1,300	535	.....
September	1,665	762	.....
October	1,725	770	.....
November	1,965	890	.....
December	1,613	900	650
Totals	17,319	7,413	650

COUNTY, 1904—Concluded.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Williams	Williamsburg	Diamond	
2 ft.	4 ft. 4 in.	3½ ft.	
Slope	Slope	Slope	
Semi-Bituminous	Semi-Bituminous	Semi-Bituminous	Total Tonnage
.....	.....	.....	6,928
.....	.....	.....	8,131
.....	.....	.....	9,079
.....	.....	.....	10,036
.....	.....	.....	11,327
.....	.....	.....	14,726
.....	.....	.....	17,484
.....	.....	.....	23,479
.....	.....	.....	34,383
.....	.....	.....	43,229
.....	.....	.....	49,888
1,000	1,925	1,000	53,484
1,000	1,925	1,000	282,174

PRODUCTION OF GARFIELD COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Coryell	Sunlight	South Canon	Midland	Pocahontas	
Thickness of vein	15 ft.	9 ft.	3 to 20 ft.	6 to 7 ft.	7 ft.	
Kind of opening	Drift	Slope	Drift	Drift	Drift	Total Tonnage
Character of coal	Bituminous	Lignite	Bituminous	Bituminous	Bituminous	
January	151	161	10,500	1,434	.....	12,246
February	1,318	156	9,828	2,030	.....	13,332
March	1,684	161	8,576	4,043	.....	14,464
April	1,552	605	9,583	5,601	.....	17,341
May	1,078	Abandoned	8,000	6,190	.....	15,268
June	1,705	.....	6,120	6,074	.....	13,899
July	1,299	.....	6,000	7,635	3,003	17,937
August	1,740	.....	6,000	5,497	3,042	16,279
September	991	.....	6,000	5,973	2,790	15,754
October	961	.....	6,000	6,200	4,221	17,382
November	2,012	.....	6,000	5,394	3,374	16,780
December	2,000	.....	10,000	5,400	3,500	20,900
Totals	16,491	1,083	92,607	61,471	19,930	191,582

PRODUCTION OF GUNNISON COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Crested Butte	Anthracite	Floresta	Alpine	Somerset	
Thickness of vein	10 ft.	4 ft.	3 ft.	6 ft.	9 ft.	
Kind of opening	Slope	Drift	Drift	Drift	Slope	
Character of coal	Bituminous	Anthracite	Anthracite	Semi-Bituminous	Bituminous	Total Tonnage
January	12,495	Not Producing	2,894	11,217	13,836	40,442
February	12,399	Not Producing	2,006	10,701	15,609	40,715
March	12,787	Not Producing	2,144	11,459	12,101	38,491
April	13,518	Not Producing	2,843	6,431	11,114	33,906
May	14,692	320	3,643	524	9,479	28,658
June	16,090	893	4,534	3,207	9,534	34,258
July	15,810	491	4,186	6,743	13,334	40,564
August	16,534	1,452	5,237	10,738	13,509	47,470
September	15,101	2,118	4,412	12,394	14,264	48,289
October	12,803	2,071	4,683	13,000	13,180	45,737
November	14,628	2,235	3,617	11,869	17,806	50,155
December	14,629	2,235	3,390	13,000	15,000	48,254
Totals	171,486	11,815	43,589	111,283	158,766	496,939

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Pictou	Robinson	Walsen	Rouse No. 4
Kind of opening	Slope	Slope	Slope	Slope
Thickness of vein	3½ to 4½ ft.	8 ft.	5 to 8 ft.	6 to 6½ ft.
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous
January	4,491	8,861	11,077	7,549
February	5,112	9,655	11,459	16,133
March	6,310	11,592	13,895	18,380
April	6,492	12,042	13,976	18,586
May	7,223	12,460	16,025	21,352
June	7,631	13,829	15,351	20,462
July	8,814	12,828	13,973	17,752
August	11,673	15,210	14,291	21,986
September	12,900	15,017	17,345	19,938
October	13,422	14,054	14,446	19,474
November	11,588	12,801	17,086	21,396
December	11,729	12,801	17,085	21,198
Totals	107,385	151,150	176,069	224,206

HUERFANO COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Hezron	Maitland	Pryor	Champion	Toltec	Midway
3 to 5 ft. 4 in.	3 to 5 ft.	4, 5 & 6½ ft.	4, 5 & 6 ft.	4½ ft.	4 to 6 ft.
Slope & Drift	Slope	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
3,782	4,098	4,394	1,483	4,043	4,380
3,640	5,521	4,886	1,602	4,556	5,460
4,924	5,660	4,910	1,568	4,652	7,125
4,205	4,474	4,962	1,300	4,595	7,630
4,280	3,151	4,992	815	4,671	7,552
5,496	3,380	4,190	1,260	5,023	6,570
6,550	3,836	5,919	1,032	5,331	5,894
7,141	5,268	6,715	1,410	5,706	7,500
6,112	6,451	7,120	2,155	5,018	6,400
7,343	8,421	7,632	2,387	5,736	7,672
7,259	7,461	7,575	2,600	6,478	8,733
7,266	7,000	8,000	2,800	6,500	9,000
67,998	64,721	71,295	20,412	62,309	83,916

PRODUCTION OF HUERFANO COUNTY, 1904.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Rugby	Sweet	Sunnyside	Pinion	
Thickness of vein	2½ to 4½ ft.	4 ft. 3 in. to 5 ft. 10 in.	7 to 8 ft.	4½ ft.	
Kind of opening	Slope	Slope	Slope	Slope	Total Tonnage
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous	
January	1,967	.....	....	....	56,125
February	2,803	.....	....	....	70,827
March	3,734	.....	....	....	82,750
April	3,474	.....	....	....	81,736
May	3,379	.....	....	....	85,900
June	3,200	.....	....	....	86,392
July	2,979	.....	....	....	84,908
August	5,115	.....	....	....	102,015
September	4,991	.....	....	....	103,447
October	6,722	.....	....	....	107,309
November	7,207	.....	....	....	110,184
December	7,500	24,366	2,100	786	138,181
Totals	53,071	24,366	2,100	786	1,109,724

PRODUCTION OF JEFFERSON COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Leyden	
Thickness of vein	9 ft.	
Kind of opening	Shaft	
Character of coal	Lignite	Total Tonnage
January	4,357	4,357
February	4,848	4,848
March	7,800	7,800
April	7,898	7,898
May	3,929	3,929
June	8,500	8,500
July	9,414	9,414
August	8,900	8,900
September	11,000	11,000
October	14,000	14,000
November	16,971	16,971
December	19,000	19,000
Totals	116,617	116,617

PRODUCTION OF LAS

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Primero	Starkville	Sopris
Thickness of vein	7 ft.	7 ft.	3½ to 9 ft.
Kind of opening	Drift	Drift	Drift
Character of coal	Bitum.	Bitum.	Bitum.
January	27,944	Strike	Strike
February	30,692	Strike	Strike
March	33,647	Strike	Strike
April	36,148	Strike	2,102
May	37,425	3,877	6,732
June	36,258	10,247	11,549
July	35,362	12,954	13,998
August	40,327	19,177	15,251
September	37,788	17,852	14,191
October	34,017	10,347	16,122
November	35,134	21,015	17,413
December	35,133	20,998	17,452
Totals	419,875	116,467	114,810

ANIMAS COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Engle	Berwind	Tobasco	Tercio	Cuatro
5½ to 7 ft.	5½ ft.	5½ ft.	5 to 6 ft. 3 in.	4½ ft.
Drift	Drift	Slope	Drift	Drift
Bitum.	Bitum.	Bitum.	Bitum.	Bitum.
2,708	Strike	Strike	7,404	Strike
8,358	10,027	162	8,639	Strike
13,645	19,873	460	10,347	Strike
12,974	21,861	865	10,461	813
14,997	23,446	1,756	11,048	2,790
16,092	24,137	3,472	11,141	3,048
16,406	23,619	4,550	11,267	4,790
20,324	30,022	4,566	14,451	4,723
20,443	30,655	3,879	14,594	5,580
20,403	31,133	5,237	13,959	4,461
25,391	30,464	6,064	7,362	6,777
25,390	31,175	6,064	7,362	6,777
197,131	276,412	37,075	128,635	39,759

PRODUCTION OF LAS ANIMAS

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Hastings No. 1	Hastings No. 2	Hastings No. 3
Thickness of vein	6 to 8 ft.	6 to 8 ft.	6 to 8 ft.
Kind of opening	Slope and Drift	Slope and Drift	Drift
Character of coal	Bitum.	Bitum.	Bitum.
January	5,021	Strike	2,678
February	8,946	4,247	3,819
March	12,885	7,194	4,808
April	7,705	8,816	1,384
May	7,677	10,018	Closed
June	6,415	13,394	.....
July	7,351	15,304	.....
August	5,760	18,069	.....
September	4,409	20,616	.....
October	4,354	20,603	.....
November	6,615	26,270	.....
December	6,000	26,000	.....
Totals	83,138	170,531	12,689

COUNTY, 1904—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Delagua No. 4	Delagua No. 5	Delagua No. 6	Delagua No. 7	Gray Creek
6 to 8 ft.	6 to 8 ft.	6 to 8 ft.	6 to 8 ft.	6 to 9 ft.
Drift	Drift	Slope	Drift	Drift
Bitum.	Bitum.	Bitum.	Bitum.	Bitum.
.....	4,023	5,280	3,304	3,897
.....	15,439	8,132	4,006	9,245
.....	19,090	11,164	5,284	10,721
.....	13,140	7,100	3,495	13,422
1,592	13,923	6,905	3,745	15,743
3,711	15,034	7,558	3 918	18,314
6,201	15,192	9,612	4,035	18,897
8,622	18,953	11,263	4,956	18,967
5,855	10,517	7,050	4,076	14,550
8,448	14,627	8,448	4,296	22,615
11,214	17,558	10,162	1,710	22,087
11,000	17,000	10,000	1,700	22,000
56,643	174,496	103,074	44,525	190,458

PRODUCTION OF LAS ANIMAS

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Bowen	Majestic	Bloom
Thickness of vein	9 ft.	5½ to 9 ft.	7 ft.
Kind of opening	Drift	Drift	Drift
Character of coal	Bitum.	Bitum.	Bitum.
January	2,786	11,690	794
February	6,022	14,800	2,253
March	7,926	14,800	1,520
April	7,795	15,200	1,216
May	4,580	14,800	1,359
June	6,375	14,800	1,080
July	6,800	15,900	1,808
August	8,965	14,900	1,828
September	8,000	13,800	1,975
October	8,244	13,500	893
November	10,000	16,600	3,000
December	12,000	15,000	3,000
Totals	89,493	179,790	20,726

COUNTY, 1904—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Brodhead	La Belle	Primrose	Green Canon	Piedmont
4 ft.	5 ft.	4 ft.	3½ to 6 ft.	4½ to 5 ft.
Slope	Drift	Slope	Drift	Slope
Bitum.	Bitum.	Bitum.	Bitum.	Bitum.
9,635	Strike	Strike	Strike	Strike
10,250	Strike	4,116	Strike	Strike
6,520	Strike	3,926	Strike	Strike
6,350	Strike	3,738	893	3,399
7,150	Strike	2,678	1,659	7,829
9,539	350	2,853	2,160	11,114
9,800	930	2,033	2,212	10,961
10,980	1,300	4,045	2,646	10,220
12,235	1,400	4,933	2,212	6,446
11,840	2,200	6,279	3,015	3,985
11,180	2,800	6,350	3,368	6,930
7,500	2,700	6,090	3,900	10,000
112,979	11,680	46,951	22,065	70,884

PRODUCTION OF LAS ANIMAS

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine.	Black Diamond	Greenville	Ludlow
Thickness of vein	3½ to 4 ft.	4½ to 6 ft 7 in.	5½ to 7 ft.
Kind of opening	Slope	Drift	Drift
Character of coal	Bitum.	Bitum.	Bitum.
January	Strike	Strike	Strike
February	Strike	1,170	Strike
March	Strike	1,851	Strike
April	Strike	3,120	1,640
May	Strike	2,849	None
June	725	3,461	1,634
July	1,092	3,316	3,754
August	1,641	5,076	4,840
September	1,978	4,542	3,435
October	2,236	5,980	4,453
November	3,332	9,649	4,230
December	5,000	10,000	4,500
Totals	16,004	51,014	28,486

COUNTY, 1904—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Forbes No. 5	Jewel	Southwestern	Valley	Stevens
5 & 6 ft.	4 ft.	4 ft. 5 in.	5½ ft.	4½ to 6 ft.
Drift	Drift	Slope	Shaft	Shaft
Bitum.	Bitum.	Bitum.	Bitum.	Bitum.
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
New Opening	.....	.....	.....	.....
865	.....	.....	.....	.....
2,700	.....	.....	.....	.....
4,022	.....	.....	.....	.....
5,600	.....	.....	.....	.....
7,500	.....	.....	New Opening	New Mine
9,000	3,679	2,292	8,490	4,900
29,687	3,679	2,292	8,490	4,900

PRODUCTION OF LAS ANIMAS COUNTY, 1904.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Haigh	Wootten	Suffield	
Thickness of vein		4 to 5 ft.	6 ft.	
Kind of opening	Drift	Drift	Drift	
Character of coal	Bitum.	Bitum.	Bitum.	Total Tonnage
January	[illegible]	[illegible]	[illegible]	87,164
February	[illegible]	[illegible]	[illegible]	150,323
March	[illegible]	[illegible]	[illegible]	185,661
April	[illegible]	[illegible]	[illegible]	183,637
May	[illegible]	[illegible]	[illegible]	204,578
June	[illegible]	[illegible]	[illegible]	258,779
July	[illegible]	[illegible]	[illegible]	263,009
August	[illegible]	[illegible]	[illegible]	304,572
September	[illegible]	[illegible]	[illegible]	277,033
October	[illegible]	[illegible]	[illegible]	287,295
November	[illegible]	[illegible]	New Mine	234,175
December	6,000	6,000	19,563	283,575
Totals	6,000	6,000	19,563	2,895,801

PRODUCTION OF LA PLATA COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Porter	Hesperus	Ute	City	Champion	Perin's Peak	
Thickness of vein	2½ to 4 ft.	5½ ft.	5 to 6 ft.	2½ to 3½ ft.	3 to 4 ft.	7 ft.	
Kind of opening	Drift	Drift	Drift	Drift	Drift	Drift	
Character of coal	Bitum.	Semi-Bitum.	Bitum.	Bitum.	Bitum.	Bitum.	Total Tonnage
January	4,787	2,325	533	2,217	1,467	.....	11,329
February	4,108	2,174	285	1,866	1,402	.....	9,835
March	4,835	2,290	189	1,911	1,323	.....	10,448
April	4,403	2,917	248	1,287	1,195	.....	10,050
May	3,383	2,571	149	1,474	1,535	.....	9,112
June	2,982	2,790	255	1,534	1,032	.....	8,593
July	2,461	2,157	103	1,632	850	.....	7,203
August	2,788	2,798	60	1,824	1,086	.....	8,556
September	3,582	3,150	454	1,205	886	.....	9,277
October	4,475	3,417	759	1,769	1,664	.....	12,084
November	5,485	3,862	477	2,049	1,902	.....	13,775
December	5,500	4,200	550	1,500	1,000	15,000	27,750
Totals	48,789	34,651	4,062	20,168	15,342	15,000	138,012

PRODUCTION OF MESA COUNTY, 1904.

SHOWING YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Book Cliff	Cameo	Palisade	Stokes	
Thickness of vein	5 ft.	6 ft.	4 ft	3 ft. 8 in.	
Kind of opening	Drift	Drift	Drift	Drift	
Character of coal	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.	Total Tonnage
December	2,000	6,500	18,800	2,250	29,550
Totals	2,000	6,500	18,800	2,250	29,550

PRODUCTION OF MONTEZUMA COUNTY, 1904.

SHOWING YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Mancos	
Thickness of vein	3 ft.	
Kind of opening	Drift	
Character of coal	Lignite	Total Tonnage
December	500	500
Totals	500	500

PRODUCTION OF PITKIN COUNTY, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2,000 POUNDS.

Name of mine	Spring Gulch	Coalbasin	
Thickness of vein	10 ft.	7 to 10 ft.	
Kind of opening	Slope	Slope	
Character of coal	Bituminous	Bituminous	Total Tonnage
January	Idle	10,804	10,804
February	Idle	12,061	12,061
March	1,079	12,225	13,304
April	9,017	11,759	20,776
May	10,020	12,031	22,051
June	11,300	11,936	23,236
July	12,950	12,086	25,036
August	16,400	12,596	28,996
September	16,050	11,115	27,165
October	15,217	10,354	25,571
November	16,344	11,437	27,781
December	16,355	11,464	27,819
Totals	124.732	139,868	264,600

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Garfield	Lehigh	White House	Reliance
Thickness of vein	5 ft. 10 in.	5½ ft.	5½ ft.	4½ ft.
Kind of opening	Shaft	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite	Lignite
January	3,003	5,831	....	.....
February	2,516	3,946	....	.....
March	3,361	2,812	....	.....
April	2,601	1,219	....	.....
May	7,749	1,103	....	.....
June	480	1,444	....	.....
July	951	1,197	....	.....
August	1,439	1,553	....	.....
September	2,113	1,371	....	.....
October	2,184	4,823	....	.....
November	3,025	5,658	....	.....
December	3,000	6,000	4,601	10,575
Totals	32,422	36,957	4,601	10,575

WELD COUNTY, 1904.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Emerson	Washington	Eureka	Davies	
3½ ft.	5 ft.	5 to 6 ft.	5 ft.	
Shaft	Shaft	Shaft	Shaft	
Lignite	Lignite	Lignite	Lignite	Total Tonnage
....	.....	....	....	8,834
....	.....	....	....	6,462
....	.....	....	....	6,173
....	.....	....	....	3,820
....	.. ..	....	....	8,852
....	.....	....	....	1,924
....	.....	. ..	....	2,148
....	.....	....	....	2,992
....	.....	....	....	3,484
....	.....	....	....	7,007
....	.....	....	....	8,683
1,000	14,264	7,799	1,000	48,239
1,000	14,264	7,799	1,000	108,618

PRODUCTION OF THE STATE OF COLORADO, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Boulder	Delta	El Paso	Fremont
January	87,996	2,042	30,568	6,928
February	71,526	1,670	26,146	8,131
March	56,956	841	21,325	9,079
April	45,590	766	18,059	10,036
May	41,096	493	16,008	11,327
June	30,362	574	15,740	14,726
July	35,463	441	14,396	17,484
August	36,893	413	22,148	23,479
September	55,699	713	17,325	34,383
October	81,618	920	19,986	43,229
November	85,286	955	19,452	49,888
December	121,818	1,000	30,150	53,484
Totals	750,303	10,828	251,303	282,174

PRODUCTION OF THE STATE OF COLORADO, 1904. —Continued.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY. ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Garfield	Gunnison	Huerfano	Jefferson
January	12,246	40,442	56,125	4,357
February	13,332	40,715	70,827	4,848
March	14,464	38,491	82,750	7,800
April	17,341	33,906	81,736	7,898
May	15,268	28,658	85,900	3,929
June	13,899	34,258	86,392	8,500
July	17,937	40,564	84,908	9,414
August	16,279	47,470	102,015	8,900
September	15,754	48,289	103,447	11,000
October	17,382	45,737	107,309	14,000
November	16,780	50,155	110,184	16,971
December	20,900	48,254	138,131	19,000
Totals	191,582	496,939	1,109,724	116,617

PRODUCTION OF THE STATE OF COLORADO, 1904. —Continued.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Las Animas	La Plata	Mesa	Montezuma
January	87,164	11,329	.....	.....
February	150,323	9,835	.....	.....
March	185,661	10,448	.....	.....
April	183,637	10,050	.....	.....
May	204,578	9,112	.....	.....
June	238,779	8,593	.....	.....
July	263,009	7,203	.....	.....
August	304,572	8,556	.....	.....
September	277,033	9,277	.....	.....
October	287,295	12,084	.....	.....
November	330,175	13,775	.....	.....
December	383,575	27,750	29,550	500
Totals	2,895,801	138,012	29,550	500

PRODUCTION OF THE STATE OF COLORADO, 1904.—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH COUNTY ALL YEARLY REPORTS GROUPED IN THE MONTH OF DECEMBER.

	Pitkin	Weld	Total Tonnage
January	10,804	8,834	358,835
February	12,061	6,462	415,876
March	13,304	6,173	447,292
April	20,776	3,820	433,615
May	22,051	8,852	447,272
June	23,236	1,924	476,983
July	25,036	2,148	518,003
August	28,996	2,992	602,713
September	27,165	3,484	603,569
October	25,571	7,007	662,138
November	27,781	8,683	730,085
December	27,819	48,239	950,170
Totals	264,600	108,618	6,646,551

PRODUCTION BY COUNTIES

SHOWING INCREASE AND DECREASE.

Counties	1903	1904	Increase	Decrease
Boulder	820,628	750,303	.....	70,325
Delta	6,000	10,828	4,828	.....
El Paso	211,447	251,283	39,836	.....
Fremont	669,920	282,174	.....	387,746
Garfield	127,392	191,582	64,190	.....
Gunnison	453,462	496,939	43,477	.....
Huerfano	1,211,754	1,109,724	.....	102,030
Jefferson	16,703	116,617	99,914	.....
Larimer	1,000	.....	.....	1,000
Las Animas	3,528,355	2,895,801	.....	632,554
La Plata	140,995	138,012	.....	12,983
Mesa	21,821	29,550	7,729	.....
Montezuma	450	500	50	.....
Pitkin	337,176	264,600	.....	72,576
Weld	98,179	108,618	10,439	.....
Small mines not reporting, production estimated	130,000	130,000	.....	.....
Total tonnage	7,775,302	6,776,551	.....	.....

Decrease for 1904, 998,751 tons.

PRODUCTION OF THE STATE OF COLORADO, 1904.

SHOWING MONTHLY AND YEARLY PRODUCTION OF THE DIFFERENT VARIETIES.

Months	Lignite	Semi-Bituminous	Bituminous	Anthracite	Total Tonnage
January	133,797	30,391	191,753	2,894	358,835
February	110,652	32,164	271,054	2,006	415,876
March	93,113	34,984	317,051	2,144	447,292
April	76,133	33,808	320,831	2,843	433,615
May	70,378	27,119	345,812	3,963	447,272
June	57,100	31,832	382,624	5,427	476,983
July	61,862	42,164	409,300	4,677	518,003
August	71,346	50,496	474,182	6,689	602,713
September	88,221	62,531	446,287	6,530	603,569
October	123,531	73,611	458,242	6,754	662,138
November	131,347	78,537	514,349	5,852	730,085
December	220,707	116,934	606,904	5,625	950,170
Totals	1,238,187	614,571	4,738,389	55,404	6,646,551
Unclassified coal, estimated					130,000
Total					6,776,551

TABLE

SHOWING THE TOTAL PRODUCTION OF DIFFERENT COMPANIES OPERATING TWO OR MORE MINES, FOR THE YEAR 1904.

	Character of Coal and Number of Mines								
Name of Company	Number of Mines	Bituminous or Coking	Number of Mines	Semi-Bituminous or Non-Coking	Number of Mines	Anthracite	Number of Mines	Lignite	Total in Tons of 2,000 lbs.
Colorado Fuel & Iron Co.....	16	2,492,389	5	179,562	2	55,404	1	1,083	2,728,438
Victor Fuel Co.....	9	900,275	1	48,267	..	.....	..	.....	948,542
Northern Coal & Coke Co.....	3	68,280	..	.....	..	.....	10	554,836	623,116
Continental Fuel Co.....	1	179,790	1	111,283	..	.....	1	42,939	334,012
Union Coal & Coke Co.....	3	181,200	..	.....	..	.....	..	.....	181,200
Rocky Mountain Fuel Co.....	4	144,821	1	16,845	..	.....	2	2,752	164,418
Pike's Peak Coal Co.....	..	.....	..	.....	..	.....	2	115,242	115,242
Porter Fuel Co.....	1	48,789	1	34,651	..	.....	..	.....	83,440
Cedar Hill Coal & Coke Co.....	2	67,018	..	.....	..	.....	..	.....	67,018
Gold King Consolidated Mines Co	2	35,510	..	.....	..	.....	..	.....	35,510
Kirkmeyer Bros.	..	.....	..	.....	..	.....	2	15,160	15,160

COKE PRODUCTION, 1904.

Name of Operator	Location of ovens	County	No. of ovens	Tonnage
Colorado Fuel & Iron Co.	Cardiff	Garfield	166	34,170
Colorado Fuel & Iron Co.	Crested Butte	Gunnison	154	57,990
Colorado Fuel & Iron Co.	Segundo	Las Animas	800	166,554
Colorado Fuel & Iron Co.	Starkville	Las Animas	192	3,185
Colorado Fuel & Iron Co.	El Moro	Las Animas	238	75,633
Colorado Fuel & Iron Co.	Sopris	Las Animas	272	64,989
Colorado Fuel & Iron Co.	Tercio	Las Animas	600	30,161
Colorado Fuel & Iron Co.	Tobasco	Las Animas	302	49,734
Colorado Fuel & Iron Co.	Redstone	Pitkin	249	46,350
Victor Fuel Co.	Delagua	Las Animas	80	1,663
Victor Fuel Co.	Hastings	Las Animas	189	27,728
Victor Fuel Co.	Gray Creek	Las Animas	100	17,619
American Smelting & Refining Co.	Durango	La Plata	34	15,275
			3,376	591,351

REMARKS.

The Cardiff ovens are supplied by Spring Gulch mine.
The El Moro ovens are supplied by the Engle mine.
The Redstone ovens are supplied by the Coalbasin mine.
The Segundo ovens are supplied by the Primero mine.
The Durango ovens are supplied by the Porter mine.

The Colorado Fuel & Iron Company was known during the year 1904 as The Rocky Mountain Coal & Iron Company. On December 1, 1904, it took back its original name.

The coal of Huerfano county is classed as bituminous or coking, although it is really semi-coking.

COKE PRODUCTION, 1904.

COKE PRODUCTION, 1904, BY COMPANIES AND COUNTIES

Companies	Total Number of Ovens	Total Tonnage
Colorado Fuel & Iron Co.	2,973	529,066
Victor Fuel Co.	369	47,010
American Smelting & Refining Co.	34	15,275
	3,376	591,351

Counties	Total Number of Ovens	Total Tonnage
Las Animas	2,773	437,566
Garfield	166	34,170
Gunnison	154	57,990
La Plata	34	15,275
Pitkin	249	46,350
	3,376	591,351

SUMMARY OF COAL PRODUCTION

FROM 1873 TO 1904, INCLUSIVE.

Year	Tons	Year	Tons
1873	69,977	1889	2,400,629
1874	87,372	1890	3,075,781
1875	98,838	1891	3,512,632
1876	117,666	1892	3,771,234
1877	160,000	1893	3,947,056
1878	200,630	1894	3,021,028
1879	322,732	1895	3,339,495
1880	375,000	1896	3,371,633
1881	706,744	1897	3,565,060
1882	1,161,479	1898	4,174,037
1883	1,220,593	1899	4,826,939
1884	1,130,024	1900	5,495,734
1885	1,398,796	1901	6,210,405
1886	1,436,211	1902	7,522,923
1887	1,791,735	1903	7,775,302
1888	2,185,477	1904	6,776,551

List of Fatal Accidents for 1904.

FATAL ACCIDENTS IN 1904.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Married or Single	Name of Mine	County	Cause of Accident
Jan. 4	Dominic Jamacito	Italian	Miner	35	Married	Rex No. 2	Boulder	Fall of roof
Jan. 19	J. J. Smith	American	Miner	26	Single	Haigh	Las Animas	Fall of rock
Jan. 21	Samuel McDowell	American	Trip-rider	28	Single	Brodhead	Las Animas	By mine car
Jan. 21	Dominic Grande	Italian	Miner	25	Single	Monarch	Boulder	Fall of rock
Jan. 21	Luke Nogic	Italian	Miner	40	Married	Rouse	Huerfano	Runaway mine car
Jan. 21	V. Nogic	Italian	Miner	30	Single	Rouse	Huerfano	Runaway mine cars
Jan. 21	John Kis	Italian	Miner	30	Single	Rouse	Huerfano	Runaway mine cars
Jan. 22	Patrick Brennan	Irish	Superintendent	42	Married	Primrose	Las Animas	Fall of roof
Jan. 31	Roy Gravis	American	Miner	20	Single	Brodhead	Las Animas	Fall of roof
Feb. 17	Joseph Mazna	Austrian	Miner	45	Married	Simpson	Boulder	Fall of rock
Mar. 11	Paul Wilson	American	Miner	29	Married	Hastings No. 2	Las Animas	Fall of roof
Mar. 23	Frank Crew	Slav	Roadman	39	Single	Delagua No. 5	Las Animas	By mine cars
April 5	William A. Davies	American	Miner	22	Single	Leyden	Jefferson	Fall of coal
April 6	Joseph Rovensike	Russian	Miner	34	Married	Hastings No. 2	Las Animas	Fall of roof
April 13	Martin Mack	German	Miner	19	Single	Sunnyside	Boulder	Fall of roof
April 23	H. Higushi	Japanese	Miner	36	Single	Walsen	Huerfano	Fall of rock
April 29	William Bevan	Welsh	Timberman	50	Married	Nonac	Fremont	Fall of rock
May 3	Charles Johnson	Swede	Miner	37	Single	Simpson	Boulder	Fall of coal
May 6	Elogo Burago	Mexican	Miner	43	Single	Hezron	Huerfano	Fall of rock
May 14	Jno. Dobbins	American	Miner	34	Single	Black Diamond	Las Animas	Fall of rock

May	20	Antonio Decarlo	Italian	Miner	25	Single, Rouse No. 4, Huerfano	Fall of rock
May	21	Edward Blackwell	American	Miner	23	Single, Berwind, Las Animas	Fall of bony coal
May	24	B. Jeisukawa	Japanese	Miner	28	Single, Primero, Las Animas	Fall of coal
June	7	John Lias	Colored	Miner	56	Married, Maitland, Huerfano	Fall of draw slate
June	10	Nelson Evans	Colored	Driver	30	Married, Starkville, Las Animas	Fall of roof
June	17	Herman Ketola	Finlander	Miner	24	Single, Hezron, Huerfano	Fall of rock
June	28	Jno. Thomsick	Slav	Miner	55	Married, Delagua No. 5, Las Animas	Fall of coal
June	30	Taylor Ford	Colored	Miner	36	Married, Magnet, Fremont	Fall of coal
June	30	Paul Starcevick	Austrian	Miner	24	Single, Crested Butte, Gunnison	Fall of rock
July	1	A. E. Whitney	American	Miner	40	Married, Black Diamond, Las Animas	Fall of roof
July	6	Ivan Hubali	Slav	Miner	46	Married, Rouse No. 4, Huerfano	Fall of rock
July	6	George Tambics	Slav	Miner	19	Single, Rouse No. 4, Huerfano	Fall of rock
July	7	Wajcieck Halozasz	Polander	Miner	26	Single, Robinson, Huerfano	Fall of rock
July	12	O. Salazar	Mexican	Miner	35	Married, Primero, Las Animas	Fall of roof
July	13	Pietro Gregioni	Italian	Miner	18	Single, Rouse No. 4, Huerfano	Fall of rock
July	13	B. Shacon	Mexican	Motorman	26	Married, Primero, Las Animas	Runaway trip
July	14	Jno. Mikisehke	Austrian	Miner	40	Married, Primero, Las Animas	Fall of coal
July	26	Jim Workoff	Colored	Miner	27	Married, Midway, Huerfano	Fall of rock
Aug.	3	Caperamo Bialanto	Mexican	Miner	20	Single, Berwind, Las Animas	Fall of roof
Aug.	4	Tony Powos	Greek	Miner	35	Married, Starkville, Las Animas	Electrocuted by trolley wire
Aug.	6	George Sublisky	Russian	Miner	29	Single, Berwind, Las Animas	Fall of roof
Aug.	11	Theodore Sanchez	Mexican	Miner	22	Single, Gray Creek, Las Animas	Premature blast
Aug.	13	Peter Tarbarelli	Austrian	Miner	42	Married, Piedmont, Las Animas	Premature blast
Aug.	24	Abram Gonzales	Mexican	Miner	40	Married, Primero, Las Animas	Fall of draw slate

FATAL ACCIDENTS IN 1904.—Continued.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Married or Single	Name of Mine	County	Cause of Accident
Aug. 25	John Stultz	Austrian	Miner	49	Married	Brookside	Fremont	Fall of rock
Aug. 29	M. Hamata	Japanese	Miner	28	Single	Rouse No. 4	Huerfano	Fall of coal
Aug. 31	Lasza Faberi	Hungarian	Miner	22	Single	Hezron	Huerfano	Fall of rock
Sept. 3	Samuel Horay	French	Driver	18	Single	Hastings No. 2	Las Animas	Run over by loaded car
Sept. 3	Manuel Naranjo	Mexican	Miner	60	Married	Midway	Huerfano	Fall of rock
Sept. 3	Ambrose Martinez	Mexican	Miner	26	Married	Berwind	Las Animas	Fall of top coal
Sept. 5	Andy Little	Hungarian	Driver	28	Single	Primero	Las Animas	Struck by a runaway car
Sept. 5	Carl Adolph Anderson	Swede	Trapper	14	Single	Starkville	Las Animas	Burned by lamp setting fire to his clothes
Sept. 26	H. Tuji	Japanese	Miner	46	Married	Primero	Las Animas	Fall of rock
Oct. 7	Frank Klinowski	Polander	Miner	34	Married	Industrial	Boulder	Fall of draw slate
Oct. 28	See report on the Tercio explosion							
Nov. 2	Martin Payten	Irish	Miner	59	Married	Sweet	Las Animas	Fall of rock
Nov. 4	Alexander Ferguson	Scotch	Oiler	64	Married	Primrose	Las Animas	Runaway trip of cars
Nov. 21	Louis Kovats	Hungarian	Miner	19	Married	Chandler	Fremont	Fall of coal
Nov. 23	M. Morihara	Japanese	Miner	27	Single	Maitland	Huerfano	Fall of rock
Nov. 25	George Majari	Greek	Miner	30	Single	Berwind	Las Animas	Fall of rock
Nov. 30	Candido Rosogiando	Italian	Miner	25	Single	Greenville	Las Animas	Fall of rock
Nov. 30	Lumberto Ludonico	Italian	Road cleaner	44	Married	Tercio	Las Animas	Burned by an explosion of his oil cadger

Dec. 11	Jacob Galup	Austrian	Miner	28	Married	Primero	Las Animas	Fall of coal
Dec. 12	Andrew W. Jardine	American	Miner	18	Single	Franceville	El Paso	Fall of rock
Dec. 17	Archie Chalmers	Scotch	Mine foreman	50	Single	Gorham	Boulder	Runaway trip of cars
Dec. 17	Joseph Kerbish	Austrian	Miner	24	Single	Royal Gorge	Fremont	Premature shot
Dec. 19	Steve Lipkovski	Polander	Miner	26	Single	Brodhead	Las Animas	Fall of roof
Dec. 19	Mate Paricich	Austrian	Miner	19	Single	Coalbasin	Pitkin	Fall of rock
Dec. 27	K. Hagashida	Japanese	Miner	28	Single	Berwind	Las Animas	Premature
Dec. 29	Mike Colombo	Italian	Driver	27	Single	Berwind	Las Animas	Fall of bone and coal
Dec. 30	Peter Carroll	Irish	Miner	65	Single	Porter	La Plata	Fall of roof

FATAL ACCIDENTS IN 1904.—Concluded.

SURFACE.

Date	Name of Person	Nationality	Occupation	Age	Married or Single	Name of Mine	County	Cause of Accident
Jan. 2	Antonio Manabosco	Italian	Loading timber	31	Single	Primero	Las Animas	Run over by tramway cars
Jan. 7	Thomas Caffrey	American	Coal dumper	35	Single	Sunnyside	Boulder	Falling down shaft
April 17	Jessipy Promola	Italian	Coke loader	24	Single	Gray Creek	Las Animas	Falling off runaway car
May 28	Gerolamo Cerro	Italian	Box car loader	28	Married	Somerset	Gunnison	Crushed between chute and car
June 5	John S. Jones	Welsh	Superintendent	53	Married	Fremont	Fremont	Struck by descending cage at shaft
Oct. 21	W. P. Raypole	American	Engineer	35	Single	Danville	El Paso	Caught in revolving fan shaft and crushed

THE TERCIO EXPLOSION.

On October 28, 1904, an explosion occurred in No. 3 mine, Tercio, which caused the death of 19 men, whose names are given below in the order the bodies were recovered:

No.	Name of Person	Nationality	Occupation	Age	Married or Single
1	Trinidad Duran	Mexican	Driver	20	Single
2	Joe Baraga	Austrian	Miner	23	Single
3	John Baraga	Austrian	Miner	25	Married
4	John Opieka	Austrian	Miner	24	Single
5	John Urbas	Austrian	Miner	26	Single
6	John D. Camillo	Italian	Miner	36	Married
7	Thos. McEwen	Irish	Miner	28	Married
8	John Pilzer	Austrian	Miner	35	Single
9	Frank Salter	German	Fire boss	..	Single
10	Jim Riccie	Italian	Miner	17	Single
11	Leopold Lanotine	Italian	Miner	20	Single
12	Chas. Brandenburg	American	Miner	22	Single
13	Ed. Hatton	American	Miner	43	Married
14	Amigo Colichio	Italian	Miner	28	Married
15	Quirno Tonti	Italian	Miner	37	Married
16	Tony Tiht		Miner	45	Married
17	Sam Rosetti	Italian	Miner	17	Single
18	Rocco De Gregorio	Italian	Miner	51	Single
19	Mike De Giacomo	Italian	Miner	42	Single

Tercio is situated in the valley of the South Fork of the Purgatoire river, thirty-one miles westward from Trinidad, Las Animas county, and is the terminus of the southern division of the Colorado & Wyoming Railroad, extended to this point when the camp sprang into existence in the early part of 1902. It is owned and operated by the Colorado Fuel & Iron Co.

TOPOGRAPHICAL FEATURES, ETC.

At Tercio the Purgatoire valley emerges into an anticlinal basin formed into a natural park of an elliptical shape and about six miles long and from one and a half to two miles wide, which is the result of a deeply eroded anticlinal fold whose axes are longitudinally with the park. This basin has a general southeast and northwest course, and the mines are located in the elevated ridge forming its eastern side where the valley intersects the tilted coal measures as it passes into the park. The town, Tercio, occupies a central position in the southeastern

wing of the basin, and it rests on the shales underlying the basal coal measures at an altitude of 8,000 feet above sea level.

DESCRIPTION OF MINE AND MODE OF WORKING.

Briefly, the plant consists of six drift openings, two washeries of 1,000 tons capacity each and 600 coke ovens. Two veins are being operated and these are stratigraphically 235 feet apart. Mine No. 3 is working the upper seam of the two. It enters near the base of the hill on the north side of the canyon in a direct line and immediately at the end of the tipple trestle, whose double tracks extend 125 feet into the mine.

The measures are pitching 52½ degrees eastwardly and the openings consist of a main entry driven on the strike of the vein and a parallel air-course 40 feet above. The entry is 8 feet wide and 7 feet high and is in 2,060 feet. Rooms are driven directly up the pitch, 20 feet wide, and 18-foot pillars and cross-cuts put through at distances varying from 60 to 75 feet apart. Room-necks or upraises are 35 and 8 feet wide; average thickness of seam is 65 inches, of the coking variety, having shale roof and floor. The mining is done by undercutting and blasting, black powder being generally used. Ventilation is effected by a natural current generated through the difference of elevation between inlet and outlet, and the inequality of temperature of the mine's atmosphere and that of the outside. At irregular intervals air-courses are driven to the surface. Three of these, viz., 1, 13 and 28, had been opened and used for some time and are respectively in the order given, 100, 333 and 434 feet long from the entry to the surface. No. 43, which is also an air-course, is up 318 feet and will connect with the surface at a total distance of 450 feet. Air measurements taken few days previous to the accident showed quantity of 11,760 cubic feet per minute to be entering the mine. At the foot of the room No. 27 this volume was divided into two splits, one entering 27 and traversing the rooms from there outward and escaping through air-course 13. The other division continuing along the main entry to the face and returning through the rooms to outlet No. 28. Attached is a map of the working made two days before the accident.

EXTENT OF DAMAGE TO BODIES AND MINE.

It was 12:55 p. m. Two distinct reports almost simultaneously, but sufficiently far apart to be distinguished, were heard, which shook the community for some distance. In the same instant volumes of smoke and dust were seen issuing violently from the main entrance and air-courses and quantities of earth and timber were hurled into the air. The force was terrific in its character, but the damage done to the mine was not as great as is usually wreaked under similar conditions. The minuteness with which every point in the workings was visited by the explosion's deathly influence, as demonstrated by numerous evi-

dences left on the bodies and the immediate surroundings where they were found, proved beyond doubt that no one in the mine lived but a very few minutes after it occurred. A majority of the bodies were severely burned and mutilated, and death was instantaneous, but there were a few who were neither burned nor badly bruised and who probably lived the limit life can be sustained without air. Of the forty-nine chutes, located one at the mouth of each room, thirty-four were blown out, and the remaining fifteen were left standing. Those left were from No. 24 to 40. The entry roof being of tenacious nature and requiring no timbering, was left practically intact for its entire length, except the double track portion at the entrance. About 100 feet at this point were driven through drift soil and disintegrated formation, and the double timbers supporting this part were blown out and a huge cave resulted. All rooms from 1 to 12 had been worked to their destination, pillars extracted and abandoned and the roof partially caved. The bulkheads of these old rooms were torn out by the force, and the hundreds of tons of rock confined above were liberated and rolled into the entry, completely filling it opposite the mouth of each. This made the work of rescuing difficult and hazardous. The entry was also nearly blocked at every one of the other rooms that had their chute and bulkheads blown out, but the debris, consisting principally of coal and timber, was here easier handled, and the danger incident to falls from above was less, and consequently a better progress was made in the reopening along this part. All the rooms operating were more or less damaged; some had nearly all their man-ways and props blown away, while in others the man-ways were left standing, but badly damaged. Considering the number of props displaced in these rooms, the fall of roof was exceedingly light.

Air-courses 13 and 28 have each an area of 8 feet by the thickness of the vein, and both were equipped with ladderways, nearly all of which, and the props securing them, were swept out or shattered.

RECOVERY OF BODIES, LOCATIONS WHERE FOUND AND THEIR CONDITION.

On the day the explosion occurred I was making a general inspection of the Chandler mine, Fremont county. I was notified by wire at 4 p. m. and took the midnight train, the first available one from Florence, and arrived at 9:30 next morning. Upon my arrival I hastened to the scene and found a force of men engaged at the mouth of the mine cleaning falls and retimbering. One of the double tracks at the entrance had been cleaned and the entry re-opened as far as room 7, but was here blocked tight by rock and timber that had fallen from the room. A passage had been made over this fall and rescuers passed in and out, but it afterwards closed again. Here also a gang of men was loading and timbering. Bert Mattison, superintendent, was on the ground supervising the work, and all that skill and strength could do was being done towards expediting the work

of recovering the bodies. As soon as the after-damp had sufficiently cleared a rescuing party, consisting of Billie Morgan, superintendent Cuatro mine; George Ward, foreman Vega mine; John Coan, contractor; Ralph Prukop, foreman, entered air-course 13, and after a long and arduous effort succeeded in reaching the entry at 7:30 a. m., 29th. The entry opposite room 14, which was next inside, was filled and impassable. Discovering that they could not go any further towards the face, the men started outward through the entry, plowing their way over the falls, and in this manner they successfully reached the mouth at 8 a. m., but did not find any bodies. Immediately afterwards a second party, consisting of Robert O'Neil, division superintendent; Ed. Sutton, engineer; Coan and Ward, went down air-course 28. The air ascending here was yet to some extent impregnated with after-damp. Arriving in the entry below, the men went towards the outside and found two bodies, who were afterwards identified as those of McEwen and Pilzer, lying on the entry between rooms 27 and 28. Opposite room 20 the entry was blocked with fallen rock and coal. Finding this to be impassable, the rescuers returned and went in as far as room 30, which is about 75 feet inside the air-course. The after-damp was so thick that they were compelled to make a hasty retreat, and some of the men almost collapsed when they returned through 28 to the open air, and all hope of any one being alive was then abandoned, and it was decided to concentrate all force and attention to the re-opening of the main entry. The work was done by 8-hour shifts, and all men that could be utilized to an advantage were employed.

Trinidad Duran was killed at the mouth of the mine by flying rocks and his body was found 50 feet outside immediately after the explosion. The bodies of those killed inside were recovered from November 2d to November 9th and at locations designated by the numbers on the map. Each number represents the name opposite the corresponding number in the list of victims.

Quirno Tonti and Amigo Colichi were the only ones that showed any evidence of having lived after the explosion. Tonti's body was found in a sitting position at the head of the manway, a few feet from the face of his room, No. 41, and was neither bruised nor burned. But in the cross-cut, a few feet below, evidence of intense heat and force having existed were manifest, so he could have lived but a very short time.

Colichi's body also was not burned nor bruised, but his coat, which was found hanging on a prop near the cross-cut to room 22, had been scorched by the heat, and quantities of dust coke were in abundance on the props. He might have lived a short time.

CAUSE OF EXPLOSION AND HOW ORIGINATED.

The mine may be termed as absolutely non-gaseous, as no trace of fire-damp has ever been found in its workings. If it was a generator of CH^4 I would have discovered it while investigating the inner workings, as at this time the ventilation in the said parts had not been restored and the air current was entirely cut off. The miners carried their powder in 5-pound tin cans and no one was allowed to store any in the mine. Therefore it was neither a gas nor an exclusive powder explosion, and the only element remaining, that we know of, to which it can be attributed, is coal dust, which was no doubt the main cause, and I am of the opinion that the explosion started in room 27. As there was no one left alive, the only guidance upon which conclusions could be based as to what point and how the explosion originated, were the impressions left along its path, indicating the direction the forces issued from, and the condition the working faces and their surroundings were left in. From the fact that there were so many outlets, the forces conflicted considerably, and the task of tracing their paths to the initial point was thus rendered very complicated, although distinct proof of an outward force all the way along the entry from the neighborhood of room 27 was apparent. From here to the face of entry there were 13 chutes left intact, while the others of the same district were blown out and the contents of the rooms fallen into the entry in large heaps that left no mark to indicate which side they had been attacked from. Yet the dust cokings deposited on the chutes and rib corners along the greatest portion of the latter distance indicated an inward initial force. The strongest proof, showing that 27 was the source of the explosion, were two blow-out shots found, one at each rib in the face of the room. Either of these could initiate an explosion in the presence of a sufficiently dust-saturated atmosphere. The bodies of the two men working in room 27 were found on the entry between 27 and 28, to which point they would naturally withdraw, to get out of the way, while the shots were being fired. The hole in the left side was drilled nearly parallel with the rib. Length remaining on solid, 1 foot 9 inches. The one in right side was gripping into rib at an angle of about 15 degrees and had 3 feet 4 inches remaining on the solid. The faces of all other rooms in operation on the day of the explosion were found in normal condition. The thickest coke deposits in the rooms were found on the upper side of props between the last cross-cuts and the faces. Evidence of intense heat having existed was noticeable in nearly every room.

RULES GOVERNING BLASTING IN THE MINE.

Firing of shots by any one other than the "shot lighters" was forbidden, and all shots were to be fired after half-past 5 p. m., when all except the said shot lighters were supposed to be

out. A miner firing a shot was subject to the penalty of discharge. Had these two shots been left to the "shot lighters" they would probably refuse to fire them from the fact that they were drilled so far on the solid; thus the accident might have been avoided, or, if they had fired them, and an explosion had occurred, the number of lives sacrificed would have been limited to the two "shot lighters."

The entry was regularly watered and the roadbed was moist when being cleaned after the explosion, but this proves that sprinkling the entry alone, while it may reduce the severity of an explosion, will not prevent one under all circumstances.

ANALYSIS OF THE COAL.

Fixed Carbon	Volatile Matter	Moisture	Ash
57.00	35.00	2.00	6.00

The danger of dust explosions is more imminent in mines where the coal is high in volatile matter and low in moisture than when the percentages of these ingredients are vice versa.

In mines where the dust is highly inflammable it might be advisable to fire all shots by electricity, with the battery situated outside of the mine. With this method the possibilities of explosion would be greatly reduced, as an interval of any number of hours could be allowed between quitting and firing time. Thus the dust kept in suspense by the men working and by moving trips, etc., would to a great measure be brought to rest and remain so until after the shots were simultaneously fired. With successive firing a tight shot would raise clouds of dust within the limits of its force and a blow-out shot, or one too heavily charged, following immediately, would thus find an alluring condition for a disaster. The greatest advantage derived from electric firing is that all men are out of the mine when it is being done.

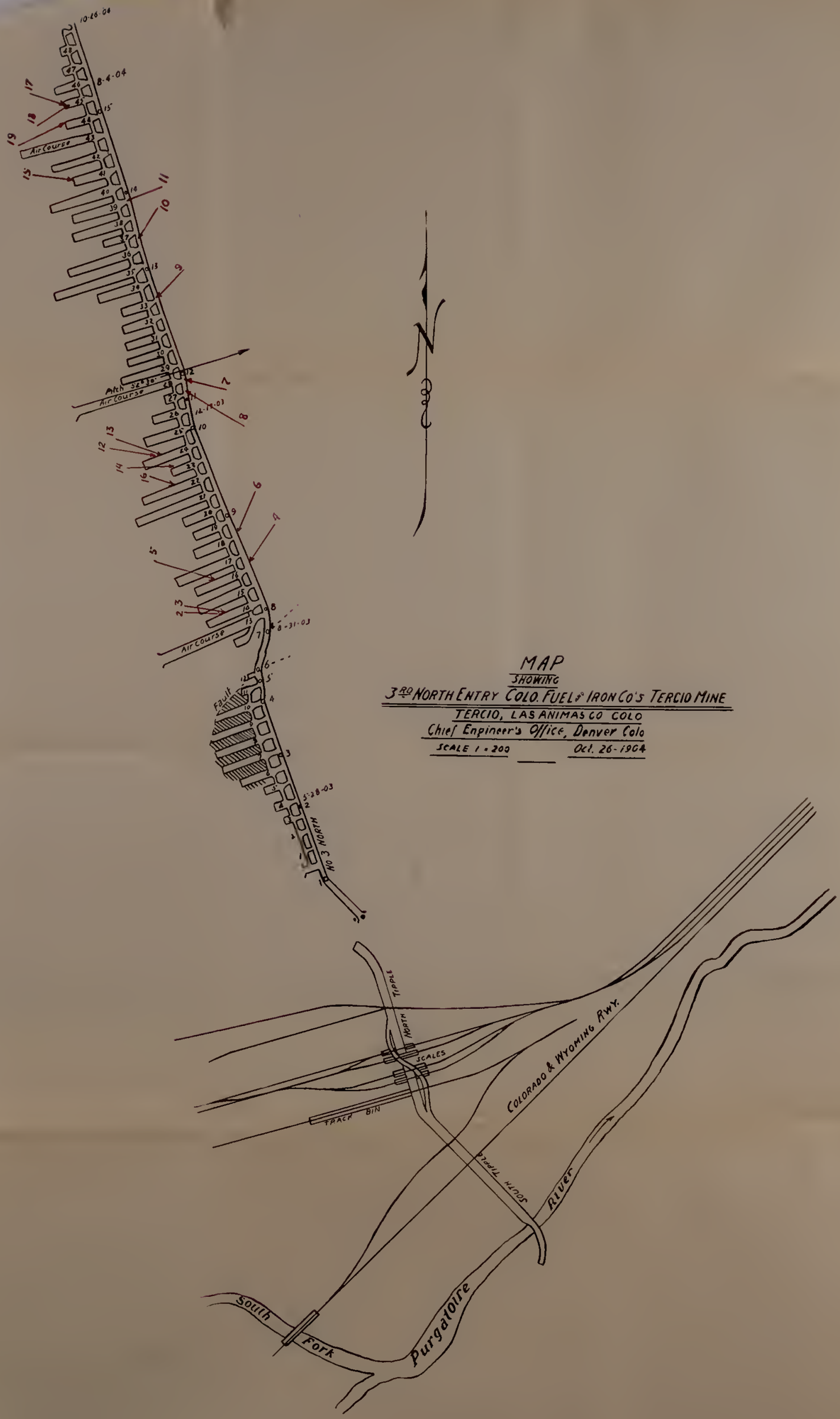
Following I quote from the report of a mining commission of Iowa, submitted February 26, 1902:

"THE INFLUENCE OF PURE AIR ON THE FORMATION AND PROPAGATION OF AN EXPLOSION.

"Next to the explosion of the powder itself, the most influential factor in these so-called 'dust' explosions is pure air near its place of origin. It is the energizing element, and without it disastrous explosions in mines would become an impossibility. Shots may blow the tamping, and dust may be present in abundance, but both will remain comparatively harmless if the mine air is impure."

VERDICT OF JURY.

"That the above deceased persons came to their death in No. 3 mine, owned by the R. M. C. & I. Co., at Tercio, said county and State, at about 1 o'clock p. m., October 28, 1904, by



MAP

SHOWING

3RD NORTH ENTRY COLO. FUEL & IRON CO'S TERCIO MINE

TERCIO, LAS ANIMAS CO COLO

Chief Engineer's Office, Denver Colo

SCALE 1 - 200 Oct. 26-1904

an explosion of coal dust. And we believe from the evidence introduced that the Rocky Mountain Coal and Iron Company is partially to blame for said explosion.

(Signed) "A. C. SALLE,
"MANUEL TORRES,
"J. E. COE,
"JOSE A. TRUJILLO,
"J. A. TORRES,
"G. S. FULLER.
"A. B. SIPE,
"Coroner Las Animas County."

COAL MEASURES, CHARACTER OF OPENINGS AND GENERAL METHOD OF MINING.

Practically all the coal deposits of Colorado are found in the Laramie measures of the upper cretaceous age. The carboniferous period, to which belongs "Probably nearly nine-tenths of all the worked and workable coal in the world" (Le Conte), is, as far as known, barren of any workable seams in this State, but teeming, instead, with precious metals. Although the periods of forming these geological divisions were separated by millions of years and by an immense strata, the cretaceous' contribution to Colorado has fully compensated for the carboniferous deficiency in the fuel line. Besides the enormous areas of coal-bearing beds with which Colorado is endowed, the product is of excellent quality and represents nearly every variety, from lignite to anthracite, to suit all purposes and requirements. Nature has also played a very important part in the commercial distribution of the productive fields. By consulting the accompanying map of the "Southern Rocky Mountain Coal Fields," one can readily see that all the markets within shipping distances, north, south, east and west, can be supplied without having to transport the product over the Continental Range by which the main fields are separated.

ESTIMATED AREA OF COLORADO COAL FIELDS. U. S. MINERAL RESOURCES.

Fields	Square miles
Grand River Field (Colorado portion)	6,950
Yampa Field, including part of Wyoming Field, in Routt county	1,100
La Plata Field (Colorado portion)	1,250
Raton Field (Colorado portion)	1,300
South Platte Field	6,800
North Park Field	300
South Park, Canon City and Tongue Mesa Districts	100
Dakota Measures (Southwestern Colorado)	300
Total	18,100

ESTIMATED QUANTITY OF AVAILABLE COAL IN COLORADO FIELDS.

Location	Accessible Area Sq. Miles	Available Gross Tonnage
Grand River Field (in Colorado)	1,116	26,384,800,000
Yampa Field	440	5,961,500,000
La Plata Field (in Colorado)	300	3,387,200,000
Raton Field (in Colorado)	473	4,490,200,000
South Platte Field	405	2,568,600,000
North Park Field	80	1,806,500,000
Canon City, South Park and Tongue Mesa Districts	49	429,000,000
Dakota Cretaceous Measures	50	169,300,000
Total	2,913	45,197,100,000
Total net tonnage, or 75 per cent. of gross estimate		33,897,800,000

The character of openings used is governed by the structural conditions of the measures in the various districts, and are principally drifts, slopes and vertical shafts, although there are a few 50 to 60 degree shafts in operation through which the coal is hoisted by means of skips. There are three mines in the State, viz., Rockvale and Coal Creek, in Fremont county, and Sunnyside, in Boulder, operated on the "long-wall" advancing system; all the others are worked on the room and pillar method. Every class of mine haulage, from mules to electric locomotives, is used. The mining in nearly all districts west of the range and with few exceptions in Las Animas county, is done by pick work and blasting, while a large proportion of the coal in Huerfano, Fremont, El Paso and Boulder counties is mined by machines. All mines, excepting Crested Butte, Coalbasin and South Canon, are using naked lights.

COAL RESOURCES OF ROUTT COUNTY.

Routt county comprises an area of 7,300 square miles, situated in the extreme northwest corner of the State. The extensive coal deposits known as the Yampa field occupy essentially the central portion of the eastern half of the county, and embrace an area of about 870 square miles of productive measures, over half of which is estimated as containing available coal. It lies in the hydrographical basin of the Yampa river. From the town of Yampa this river runs in a northeasterly course, skirting the foot of the Park range a few miles east and parallel with the eastern margin of the coal field for a distance of thirty-two miles to Steamboat Springs, whence it assumes a nearly due west course through the central part of the field. At present the most convenient means of transportation to and from the district is by a stage line from Wolcott on the D. & R. G. R. R. to Steam-


SOUTHERN
ROCKY MOUNTAIN
COAL FIELDS
Showing
Cretaceous coal bearing formations
BY L S STORRS
Scale
LEGEND
Principal coal mines
COLORADO
NEW MEXICO
UTAH
DENVER
Colorado Springs
Greeley
Grand Junction
Cortez
Durango
LA PLATA FIELD
YAMPA FIELD
GALLUP FIELD
Gallup
MOUNT TAYLOR FIELD
CERRILLOS AREA
SANTA FE
Las Vegas
Springer
Trinidad
Walsenburg
Florence
Pueblo
Del Norte
Alamosa
San Luis
JARA LOSA AREA
CARTHAGE AREA
Socorro
Los Lunas
Puerto de Luna
GUADALUPE
SAN MIGUEL
BERNALILLO
RIO ARRIBA
SAN JUAN
JICARILLA IND RES.
UTE IND RES
MONTEZUMA
APACHE
MOQUI IND RES
NAVAJO IND RESERVATION
EMERY
WAYNE
GRAND
UNCOMPAHGRE IND RES
UINTAH RESERVATION
ARAPAHOE
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EL PASO
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boat Springs, a distance of seventy-six miles, which is covered in a day and a half.

The stage line from Yampa to Steamboat Springs passes over the lower cretaceous shales along the west bank of Yampa for some sixteen miles, where the river swerves to the right and flows through a narrow gorge at the eastern extremity of a large prominence locally known as "Yellow Jacket." This mountain is completely capped by an extensive layer of basaltic lava, which probably once extended over the entire valley to the south, as numerous isolated, narrow domes of 50 and 100 feet are left as remnants of the main sheet, which has been eroded. Before reaching Steamboat Springs the upper measures of the Jura-Trias are passed over, and Dakota quartzites outcrop in bold relief in the rolling hills on the west side. The eastern limit of the field is defined by the tilted outcrop of the measures.

From the northeastern extremity of the field, near California Park, the eastern boundary runs in a general southerly course and nearly parallel to the Park range for a distance of thirty-five miles to a point on Oak creek about six or eight miles northwest of the town of Yampa. The outcrop intersects the Yampa river a few miles west of the mouth of the Elk river. The southern line of the outcrop turns due west a little north of Yampa and continues in this direction to the "Flat Top" mountains.

The coal formation proper belongs to the Laramie, and is represented by strata of 1,500 to 2,000 feet in thickness, consisting almost entirely of shales and sandstones. The former predominate and vary slightly in color and character, occasionally containing iron concretions.

The productive seams are found in three distinct groups, which are separated by an average of 500 feet of barren strata, shales and sandstones. A considerable area of the interior of the field is overlain by Post, Laramie and Eocene formations, which include several beds of workable thickness, but the coal is of inferior grade to that of the lower measures. In those districts which have not been invaded by eruptive occurrences the formation of the Laramie is very consistent in the arrangement of its members. The numerous sandstone ledges associated with the various coal seams manifest a remarkable continuity and uniformity of thickness, and where the formation has been tilted and subsequently eroded form prominent features of the topography of the country. The coal varies greatly in character, representing nearly all varieties, from lignite to anthracite, but the indications are that true bituminous or coking coal, as well as anthracite, is of limited occurrence.

Considerable prospecting has been done in the various regions where the canyons cut through the tilted measure and where the beds are rendered accessible, but, owing to the lack of transportation facilities, no development beyond that stimulated by the limited local demand has been done. The most

extensive openings along the eastern margin of the field will not exceed 300 feet in depth.

THE ANTHRACITE DISTRICT.

The anthracite region is situated in the northeast corner of the field. Although considerable prospecting has been done in this district, the exact area containing this class of coal has not been accurately determined, and the estimates given by various expert geologists vary greatly. Prof. W. Weston, in his report to the Denver, Northwestern & Pacific Railway Company, estimated it at 40 square miles, and he further states that "Discovery and development will probably show this area to be a great deal more." Pilot Knob mountain, the chief agent in the transformation of this coal from its original lignitic state to anthracite, occupies a central position in the southern half of the district, and is situated at the head of Deep creek, about 18 miles northwest of Steamboat Springs. Its summit has an elevation of nearly 9,000 feet above sea level. It is formed by the central body of a huge basaltic laccolite, surrounded by Laramie coal-bearing formations. Several dykes of large dimensions branch out in different directions from the main body, dividing the area into large, unequal sectors, and the measures are intruded by basaltic lava sheets. These intrusive sheets were the chief factors in promoting the metamorphism of the coal, and the extent of the anthracite-bearing area depends on the continuity and maintenance of the relative proximity of these igneous intrusions to the various seams. These sheets can be traced for miles along the outcrop where the measures are brought to view.

THE ELKHEAD ANTHRACITE COAL COMPANY.

Two miles southwest of this eruptive mountain is the property of the Elkhead Anthracite Coal Company, on which is opened a drift prospect, four distinct seams of coal varying from 30 inches to 14 feet in thickness, aggregating 31 feet. These seams are assigned to the middle series of the three groups, which characterizes the less disturbed sections of the main field. The openings are in Morgan Creek canyon, which traverses the property in a southwesterly course. The length of the prospects ranges from 10 to 150 feet, which is hardly sufficient depth to escape the deteriorating effects of surface influences, although the coal had assumed its natural color in all cases except one, which still showed a little rusty and soft.

THICKNESS OF VEINS, RELATIVE STRATIGRAPHIC POSITION AND DEGREE OF CLEANNESS.

(a) Upper vein, 6½ feet thick, classed bituminous, extremely brilliant in luster, cuboidal fracture, perfectly free from impurities, slips irregular and infrequent, dark, strong and tenacious

slate roof and carbonaceous clayey floor, both exhibiting remarkable uniformity and smoothness, thus making it an excellent blasting coal. From an economic standpoint, I consider this the best seam on the property.

(b) Underlying "a" by 100 feet is vein "b," 12 feet thick, intersected near the center by 10 inches of arenaceous slate, good roof and shale bottom.

Thirty feet beneath "b" is "c," anthracite, 30 inches thick. This opening had a depth of only 10 feet from the outcrop. Beneath "c," and separated from it by 120 feet intervening strata, is "d," classed as anthracite, 10 feet thick, intersected by 10 inches of carbonaceous slate. Dip of formation is 13½ degrees, S. 72° W., which is practically that of the drainage, but slightly exceeding the fall of the canyon.

This property is 18 miles from the nearest point on the present survey of the main line of the Moffat railroad. The surface for miles in every direction is thickly covered with aspen and spruce timber of all sizes for mine timbering.

COAL ANALYSES FROM THE FOUR SEAMS.

Seam	Fixed Carbon	Volatile Matter	Ash	Moisture	Made by
a	67.04	21.92	9.10	1.94	H. E. Wood, Denver
b	51.97	36.68	4.20	6.80	H. E. Wood, Denver
c	88.10	5.80	4.50	1.60	H. E. Wood, Denver
d	84.61	7.78	5.20	2.41	H. E. Wood, Denver

THE COLORADO ANTHRACITE COMPANY.

Three miles northeast of Pilot Knob is the Colorado Anthracite Company's property, embracing 3,210 acres of coal land and commanding about 2½ miles of frontage. The upper and middle groups have been eroded for some distance back from an escarpment which marks the outcrop of the measures of the lower group, also the eastern edge of the field. Practically all the prospecting which has been done on the property by means of drilling and drifting is confined to the lower series, which has been found to contain four workable seams classified as ranging in character from bituminous to anthracite, and from 2 feet 5 inches to 6 feet 3 inches thick. The accompanying section, being the record of one of the drill holes, was kindly furnished this department by Mr. L. Shelton, of Hayden, Colo. This property lies at an elevation of 8,000 feet above sea level, and can be reached from the main line of the Moffat railroad, as now surveyed, by a branch line via Deep creek, which would be about 20 miles long.

VERTICAL SECTION.

As given by one of the drill holes one-fourth mile back from the outcrop:

	Clay	23 ft.
No. 1	Coal	5 ft.
	Gray shale	9 ft.
	Yellow sandstone	21 ft.
	Dark shale	8 ft. 6 in.
	Coal	1 ft.
	Shale	12 ft.
No. 2	Coal	2 ft. 5 in.
	Dark shale	8 ft. 5 in.
No. 3	Coal	6 ft. 3 in.
	Dark shale	18 ft. 4 in.
	Coal	1 ft.
	Dark shale	25 ft. 6 in.
No. 4	Coal	4 ft. 4 in.
	Shale	25 ft.
	Basalt	1 ft.

ANALYSIS OF THE COALS.

By H. E. Wood, Denver.

Seam	Thickness	Fixed Carbon	Volatile Matter	Ash	Moisture
No. 1.....	5 ft.	80.00	6.50	10.00	3.50
No. 2.....	2 ft. 5 in.	76.90	13.60	8.80	0.70
No. 3.....	6 ft. 3 in.	86.90	8.40	3.90	0.80
No. 4.....	4 ft. 4 in.	79.30	1.90	13.80	5.00

DISTRICTS OF SAGE AND DRY CREEKS.

Six miles south of Hayden, across an undulating low plateau, at the southern limit of the Hayden basin, the Laramie strata are tilted at an angle of twenty-five degrees with the horizontal. Sage creek has its source in the uplifted measures of the anticlinal fold, characterizing the Hayden Gulch and Williams Park regions. It runs in a northeastward course, forming a deep gulch, as it cuts transversely through the uplifted ridge of the coal beds, and the massive sandstone ledges are prominently exposed, but the softer shales and coal veins are obscured by drift soil and talus, necessitating a little prospecting to find the various coal seams . The three coal-bearing groups are here well developed, but exploration has been confined chiefly to the upper two, in which are contained eight workable veins of coal, four

in each. The seams of the upper series vary in size from 3 to 13 feet, aggregating 25 feet. Those of the middle range from 4 to 15 feet in thickness and aggregate 30 feet, making a total thickness of 55 feet. The respective groups are estimated to be from 400 to 500 feet apart. The two upper seams of the middle group, which are 7 feet and 11 feet 5 inches in thickness and separated by 75 feet of strata, have each been opened by single drift entering the base of the hill on the east of the gulch, and are 75 and 170 feet in length with an average width of 30 feet. The product was sold to the neighboring farmers and in the town of Hayden. This coal is of the semi-coking character, bright luster and close texture; slips far apart, irregular and ill defined. Both have sand rock top and carbonaceous shale bottom, presenting smooth faces to the coal, which is an important factor in promoting economical mining. The coal is mined by blasting, and works excellently with powder. The inclination of the measures is in the same direction as the drainage of the canyon, and the coal-bearing hills forming its sides ascend to a height of 500 to 600 feet, thus affording a lift of from 1,000 to 1,200 feet above water level.

About two miles southwest from the mouth of Sage creek canyon is Dry creek gulch. The measures have here assumed a more moderate pitch, intersecting the gulch diagonally, and exposing only the upper series, the top seam of which is opened by a drift to a depth of 300 feet. This seam has the appearance of being more of a lignitic character. Thickness of seam is 11 feet, and absolutely free from any streaks of impurities. The cleats are frequent and well defined. Three feet of the upper portion of the vein have been left to support the roof, which was rather tender near the entrance, but has not been tested in the deeper workings. This property belongs to the same company as that of the Sage creek district, and controls 8,000 acres of this choice land. From the course now intended to be pursued by the Moffat railroad line, this property can be reached by six miles of a branch road, with a grade not to exceed 1½ per cent. The future value of this property is apparent, when we consider the relatively favorable location, the accessibility of points of attack, the immense tonnage contained above water level, and the natural conditions favoring its being economically operated.

ANALYSIS OF THE COALS.

Series	Seam	Fixed Carbon	Volatile Matter	Ash	Moisture	Made by
Middle	11 ft. 5 in.	60.40	31.40	1.20	7.00	H. E. Wood
Upper	11 ft.	55.25	36.38	1.85	6.52	H. E. Wood

HAYDEN GULCH.

Twelve miles southwest of Dry creek, in and about one mile above the mouth of the Hayden gulch, which empties into the

Williams Fork river, are the Scott & Green properties. The three coal-bearing groups, with about 600 feet of the adjacent strata beneath, are here represented in one precipitous front. The lower group has been extensively prospected, and is accredited with containing five workable seams. At the time of this reconnoisance, only two of the various prospect drifts were accessible; the others, consequent to their long exposure to the weather, had caved.

The "Green" vein, which is third from the top of lower series, is opened by a drift entering under a thick stratum of sandstone near the base of the hill on the northwest side of the canyon. The opening was 135 feet in depth, driven in ordinary room width, and had been the main source of supply of domestic coal for the few neighboring farmers for some time. Thickness of seam, 10½ feet; bottom consists of clayey shale; coal, of semi-coking character; inclination of measure is 6½ degrees in opposite direction to the drainage of the canyon. Besides the vast amount of coal contained and the natural features it possesses which are essential for the most profitable mining, this property occupies an extremely important frontage, controlling the key to a large area of coal-bearing ground situated behind it. It is owned by Leon H. Green, of Pagoda.

About one-fourth of a mile to the northeast, in a narrow canyon, which is a tributary to the Hayden gulch, is the Scott tract, on which the second vein from the top of the lower series is opened by a drift 50 feet in length. This seam is 10 feet thick, has 3 feet of slate roof overlaid by a layer of brown sandrock. Chemical analysis shows this to be much the same character as that of the Green seam, but has a denser and harder appearance.

ANALYSIS OF THE COALS.

Seam	Fixed Carbon	Volatile Matter	Ash	Moisture	Made by
Green	55.40	34.20	3.30	7.10	H. E. Wood
Scott	52.16	34.46	5.70	7.80	H. E. Wood

WILLIAMS PARK.

In Fish Creek canyon, which is the outlet from Williams park, the coal-bearing ridge is cut through at right angles to the strike and at a depth of 800 to 1,000 feet below the summit. The tilted measures form an angle of 51 degrees with the horizontal. Direction of the dip being north, 72 degrees east. A few of the seams have been prospected, but the openings had fallen in, precluding the possibility of making an examination.

OAK CREEK.

This district embraces the extreme southeast corner of the field. Considerable prospecting has been done by the various land owners for miles along the banks of Oak creek, and large

veins of coal of good quality discovered. The three coal-bearing zones are fully represented, but the most extensive development has been confined to the lower horizon, in which as many as six workable seams are reported.

Two miles west of the Pallas postoffice, on the James property, in Oak Creek canyon, two small banks have been opened and are being operated to furnish fuel to the town of Yampa and the farmers in the immediate vicinity. The openings are on two different seams, separated by 75 feet of intervening strata, and are 100 and 300 feet in length. The bottom seam is divided into two sections of 5 and 3 feet, respectively, by 3 feet of brittle carbonaceous clay. Mining is confined to the lower (5 feet) bench exclusively and the clay held for roof. A very peculiar feature is noticeable in the difference of fracture of the coal in the upper and lower halves of the 5-foot bench. The upper portion has a bright luster and a square fracture, while the other is of a duller luster and breaks in slabs with a horizontal micaceous fracture. The two classes are kept separate as far as practicable. The former is sold for domestic use, and the latter is utilized for blacksmithing, for which purpose it has a wide local reputation. The upper seam is 12 feet thick, semi-coking in character; slate roof, which, being only 100 feet from the outcrop, was rather tender, but it may improve with greater depth. Dip of measures, about 5 per cent. opposite to the direction of the drainage. The Moffat railroad survey passes in close proximity to this property.

ANALYSIS OF THE COALS.

Seam	Fixed carbon	Volatile matter	Ash	Moisture	Made by
5 ft.	60.0	32.0	4.5	3.5	H. E. Wood
12 ft.	55.5	37.0	4.5	3.0	H. E. Wood

That this enormous wealth of coal has been permitted to lie undeveloped up to the present time is, as previously stated, due to the fact of the remoteness of the field from transportation facilities. The development and a systematic mining of this rich section of the State of Colorado will come in response to fuel demands. The completion of the Moffat railroad, which is now being constructed, will bring the field in touch with extensive markets east and west. The coal being of superior quality to that of the eocene beds of the ultra west and northwestern states, will enable the producers successfully to enter the Pacific markets.

NEW MINES AND IMPROVEMENTS IN OLD MINES. BOULDER COUNTY.

ACME MINE.

The Acme mine is situated in the suburb of the town of Louisville. It is owned and operated by the Northern Coal & Coke Co., and connected with the Louisville branch of the Colorado & Southern Railroad. It is opened by two vertical shafts, 190 feet deep. The main shaft has three compartments, two 8x5½ feet for hoisting purposes, and one 8x4¾ feet for pipe lines, and a ladder escape-way, with each division separated from the other by timber partitions from top to bottom. The air shaft, situated 155 feet from the main, is 6x7 feet in the clear, and is also fitted with a ladder-way for the convenience of the employes in the event of any emergency. The seam has a thickness of 6 feet, practically flat, and is attacked on both sides of the shaft. The shaft bottom is provided with long double partings of sufficient width to serve a third track, should growing output demand it.

Operations on the property were first inaugurated in the latter part of the eighties, when the shaft was sunk to an upper seam, which lay 130 feet below the surface. Some years ago, when the coal of this seam was worked out, the mine was abandoned and all surface and underground equipments removed from the property.

In 1903, subsequent to the discovery by the aid of a drill hole that the lower seam was of workable thickness, operations were resumed, the shaft enlarged, retimbered and sunk to the said lower seam. The hoisting plant and appliances, head-gear and tipple equipments are all of modern types, with their arrangements up to date in every detail, and will be able to handle from 1,000 to 1,200 tons daily, once the workings are sufficiently developed to produce it. Up to the present date the underground work has been devoted principally to driving entries. Ventilation is effected by a W. E. Cole 12-foot force fan, with its casing fitted so the air current can be reversed when necessary, and at 60 revolutions produces 58,000 cubic feet of air per minute. The safe and sanitary condition of the mine proves that the health and comfort of the employes were considered amongst the chief factors by the management while opening and equipping the mine. Such precaution is bound to result in ultimate economy to the company.

VULCAN MINE.

The Vulcan mine is situated a mile and a half southwest of Lafayette, and is opened by a three-compartment shaft 182 feet deep. The shaft was sunk by the Rocky Mountain Fuel Co. Ground was first broken July 1, 1903, and the coal was struck September 15th the same year. From the fact that the property

has no railroad connections, developments have been greatly retarded and concentrated exclusively to driving entries. The seam is 8 feet thick and interstratified 18 inches from the bottom, by a band of slate varying from 3 to 6 inches in thickness. Dip of formation is from ½ to 1% S. 80° E. The workings are also connected by an air shaft situated 160 feet from the main, one end of which is separated by a 3-inch plank partition, and is equipped with a ladder-way for the use of the employes in case of necessity.

In August, 1904, the property was sold to the Northern Coal & Coke Co., who will endeavor to secure immediate railroad connection and force developments to extensive proportions. The mine is to be equipped with a Cole fan to furnish ventilation for the workings, and when fully developed will give employment to a large number of men.

MATCHLESS MINE.

The Matchless mine is owned and operated by the Fox, Patterson & Evans Co., and is situated about one mile west of the town of Louisville. The mine is opened by a three-compartment shaft 230 feet deep, which was sunk in the early part of 1903, since which time it has been almost continuously operated, and has now a daily capacity of 300 to 350 tons. Each of the two hoisting compartments is 7 feet 11 inches by 5 feet 6 inches in the clear, and the third, which is at present utilized as a temporary air-shaft and ladder-way, is 7 feet 11 inches by 2 feet. The seam lies nearly horizontal and has an average thickness of 5 feet, is perfectly free from impurities, and in quality it ranks among the superior grades of coal produced in the South Platte field. The roof consists of argillaceous slate, overlain by a comparatively thick stratum of variegated sandstone, which, due to its undulating form, occasionally displaces the former and rests immediately upon the coal. Method of mining pursued is double entry, room and pillar, and the coal is mined by Ingersoll-Sergeant punching machines. Ventilation is produced by a 10-foot Stine fan, which, under ordinary conditions, could give 60,000 cubic feet of air per minute, but owing to the limited area of the air compartment, already mentioned, with which the fan is temporarily connected, a vast proportion of the fan's efficiency is destroyed. However, this disadvantage will be overcome once the air-shaft is sunk and the fan permanently installed. The hoisting is done by a double 12x18-inch Bay State second motion engine, winding an 1-inch steel rope on a 5-foot diameter drum. The head-gear and all other surface equipments are substantially constructed, and the hoisting appliances are provided with safety devices, in compliance with the requirements of the law. The property is connected with the Louisville and Boulder branch of the C. & S. Railroad by a one and one-half-mile spur.

REX NO. 1 MINE.

In the early part of 1903 a new air-shaft was sunk to the workings of the Rex mine, at Louisville. The shaft is 6 by 7 feet in dimension and is fitted with a new 18-foot Cole fan, producing at 80 revolutions 100,000 cubic feet of air per minute, which is nearly double the quantity obtained previous to installing this new ventilator; hence a remarkable improvement in the sanitary condition of this mine.

The Standard Coal and Land Company has just completed the sinking of a new shaft, two miles east of Lafayette and one-fourth of a mile south of the Vaughn mine, which is also owned by this company.

The shaft is 7 by 14 feet in the clear and 250 feet deep to the top of the seam, which is 7½ feet thick, and clean. The hoisting appliances and tipple equipments are to be of the latest improved types, and the plant is intended for a daily capacity of 1,000 tons. There are from 300 to 400 acres of coal land tributary to the new shaft, and arrangements are already made for the extension of the Vaughn spur of the B. & M. Railroad to the property.

FREMONT COUNTY.

CUCKOO MINE.

The Cuckoo mine, which was opened in the early part of 1903, is located near the western outcrop of the northern extension of the Canyon City coal field, one mile south of Chandler and about five miles southeast of Canyon City, the county seat of Fremont county. It is owned and operated by the Great Western Coal Company. Due to orographic movements, the measures along the western margin of the field are highly inclined, but the degree of pitch soon moderates until, at a distance of a few thousand feet east of the croppings, the formation assumes a nearly horizontal position.

The mine is opened by a three-compartment vertical shaft, situated about 600 feet east of the tilted terminus of the lower seam, and was first sunk to a depth of 117 feet, from which point a tunnel was driven west through the overlying and intervening inclined measures for a distance of 485 feet, disclosing five distinct seams, two of which are of workable size, but the other three are, as far as tested by the limited development, either too thin or too heavily impregnated with impurities for profitable mining. In the former two, entries have been opened north and south, and rooms worked on the pitch, which approximates 70 degrees. The lower (Canon City) seam has not yet been opened.

Ventilation is furnished by a 12-foot fan, situated at the air-shaft, which is about 600 feet southwest of the hoisting shaft. At the date of this writing, the main shaft is being sunk for

another lift. The management contemplates supplanting the present hoisting and tipple equipments with larger and more modern ones, so as to be able to handle the increased output that the mine is expected to produce. Arrangements are already made for the extension of the Chandler branch of the D. & R. G. Railroad to the property.

NONAC MINE.

After being idle for a period of six years, operations have been resumed on this property. The mine is situated about one mile south of Canon City, and is operated by the Rock Mountain Coal and Iron Company. The opening consists of a slope and parallel air-course entering upon the western outcrop of the seam, and is ventilated by a force fan. At present there are 30 men employed, and the force is to be increased as rapidly as developments will permit. The mine is connected with the Santa Fe Railroad by a branch from Canon City. The product is high-class for domestic and steam uses. Shipments commenced July 1, 1904.

RADIANT MINE.

This mine, which is now being opened by the Victor Fuel Company, is situated three miles south of Coal Creek, on the site of an old prospect opening, locally known as the "Shaw mine." The coal-bearing measures of Fremont county, known as the "Canon City field," embrace an area of about 34 square miles, all of which is believed to contain at least two workable seams, and some portions more. This productive area is formed of table lands and bluffs, is 11 miles long and averages a little over 3 miles in width, its major axis running parallel with the northern extremity of the Green Horn range, which bounds the field on the west. Heretofore mining has been confined altogether to the northern half of the field, where several mines of extensive proportions have been operated for over twenty years. This is the first attempt at developing the southern half of the district, which is now the scene of great activity.

The mine is opened by three parallel slopes entering at the eastern outcrop of the field and driven 200 feet apart on the dip of the vein, which is about four degrees. The middle opening is to be used as a haulage-way, and the two parallels as main air-courses and man-ways, by the aid of which the employes can pass in and out of the mine without being exposed to the dangers incident to traveling through an haulage-way. The vein is three feet and two inches thick and is expected to increase with greater depth. The coal is of high grade for domestic and steam purposes. Mining is to be conducted on the long-wall advancing method. At the time of this writing, the slopes were down in the neighborhood of 800 feet, but the work of branching out had not yet commenced. Ventilation will be produced by a "Capell" fan capable of delivering from 100,000 to 150,000 cubic feet of air per minute.

An extension of four and three-quarter miles of the Santa Fe Railroad from Rockvale to the mine is being constructed and will be completed within a few weeks. The hoisting and tipple arrangements will be modern in every detail, and the plant is intended for a large daily output.

CHANDLER MINE.

During the latter part of October, 1904, a new ventilating fan, 18 by 3½ feet, was put up at this mine, the installing of which increased the total volume of air heretofore circulating by over 50 per cent. In addition to the above improvement, the hoisting cages have also been equipped with overwinding detaching hooks.

GARFIELD COUNTY.

THE SOUTH CANON MINES.

These mines are situated in a deep ravine, locally known as "South canon," five and one-half miles west of the town of Glenwood Springs, the county seat of Garfield county. The canyon in question enters the elevated rolling hills flanking the "hog back fold", of the lower Laramie coal measures, and which form the south side of the narrow valley of the Grand river, five miles due west of Glenwood. The formations are tilted to an angle of fifty-five degrees, dipping south twenty-six degrees west. From its entrance to the point where the mines are located, being a distance of two miles, the canyon has a general southwesterly course, its bottom having an irregular width varying from zero to a maximum of about 300 feet, the widest being over areas inclosed by the predominant shales and the narrowest portions in line with the prominent massive sandstone ledges, the latter being more resistive to erosive influences. The bottom has also a nearly uniform ascent of about three degrees twenty-seven minutes for the entire distance, thus attaining an elevation of 633 feet above the entrance, or 6,200 feet above sea level. The sloping sides rise at an angle of thirty to forty degrees with the horizontal, until they reach vertical heights varying from a minimum of 500 to nearly 1,000 feet. The highest points being above the openings, hence the excellent opportunity for extensive lifts above water level. The canyon traverses the measures at nearly right angle to their line of strike, giving an admirable cross section of the mesozoic strata, including 2,000 feet of the upper portion of the Jura-Trias and all of the cretaceous measures in their chronological sequence from the Dakota sandstone to the lower series of the Laramie coal beds.

The property is owned and operated by the Boston-Colorado Coal Company, and occupies 2,040 acres of ground, which was so wisely selected as to command nearly all the productive seams along the apex for a distance of over a mile and a half on both

sides of the canyon. Here the Laramie measures are found to be approximately 3,500 feet thick, the lower 1,000 feet of which is credited with containing as many as seven veins of clean coal generally classed as semi-coking. Present developments are confined to the lower three. The "E" vein, which is geologically the bottom seam of this series, is three feet thick, carrying a high percentage of fixed carbon, and having a semi-anthracite appearance, is free from soot, and especially adapted for domestic purposes. Above "E," and separated from it by fifty feet of alternating shale and sandstone, is the "Wheeler" vein, averaging twenty feet in thickness. Its product, although a fair quality for domestic use, is used principally for steam purposes. Fifty feet above, is the "D" vein, five feet thick, with coal presenting similar appearance in brililancy and fracture to that of "E."

METHOD OF MINING.

The openings consist of six horizontal tunnels, three on each side of the canyon, and driven on the strike of the veins 26 degrees S. of E. and N. of W. The main tunnels of the "Wheeler" enter on a plane with the bottom of the canyon, and are carried 7 feet high by 10 feet wide, while those of the smaller veins are 6 by 7 feet. The entries are driven on the foot-wall, and each is accompanied with a parallel air-course 40 feet above. All are worked on the room and pillar method. The rooms are 30 feet wide, with 40-foot pillars.

The "Wheeler" vein is mined in two sections. The preliminary work consisting of driving a room to its destination on the lower bench, which is from 6 to 8 feet, thus leaving about 12 feet of top coal. When this is done, the upper bench is then cut through to the hanging wall at the bottom of the room, whence operations are continued upwards until all the coal is taken out. Each room is provided with man-ways along both ribs, constructed with props at intervals of from 5 to 6 feet apart, and lined with three-inch planks, so as to completely isolate them from the main body of the room. The man-ways are also utilized as air-courses to furnish ventilation to the rooms. The rooms of the two smaller veins are worked in one face. The coal is mined by blasting exclusively. Class of powder used is the flameless and black.

VENTILATION.

The plant is equipped with six ventilating fans, manufactured by W. C. Cole, of Washington, Ind. Their casings are so arranged in their construction that the fans can be made to force or exhaust, to suit the local requirements. They are driven by electric power with belt connections, and are capable of delivering from 30,000 to 40,000 cubic feet per minute. Along every entry is a two-inch water pipe directly connected to a Hendrie & Bolthoff triplex electric pump, situated at a well on the west bank of the creek. These pipes are provided with plugs at

intervals of 70 feet, and every room is supplied with a hose for sprinkling when necessary.

The mines are connected with the tipple by an electric tramway three miles long. This tramway has a three-foot gauge, and is laid with 60-pound steel rails. The product is hauled by two (Jeffrey) electric locomotives, weighing 10 and 15 tons respectively. The tramway cars, which are used also in the "Wheeler" workings, have a capacity of 3½ tons.

The four openings of the thinner veins are on a zone 30 feet above that of the "Wheeler." These are equipped with smaller pit cars, which deliver their coal into two bins close to the mines, having a capacity of 50 to 70 tons, and are situated near the center of the canyon, being equally distant from the various openings. The outlets of these bins are constructed in the form of a chute, and the coal is here reloaded into the tramway cars for further conveyance.

The tipple, mine office and power plant are situated on the south bank of the Grand river, where a connection is made with the Colorado Midland R. R., which passes through the valley on its way east and west. The tipple stands 70 feet above the railroad tracks, is strong and substantially built with 10 by 12 timbers, and arranged to separate the coal into three different grades. The railroad tracks, three in number, have an aggregate length of 4,800 feet. The power plant consists of two 16 by 24 inches Reynolds Corliss engines, two Edison bi-polar generators, 150 K. W., 500 volts each; two horse-power Heine safety boilers are used to run the power plant. The present capacity of the mines is 500 tons daily, but it is the intention to increase the output to 1,200 to 1,500 tons daily in the near future.

The camp is situated half-way between the tipple and the mines, on a slightly elevated plateau, on the west bank of the creek. It is thoroughly up to date, consisting of 25 dwelling houses, each containing 3 to 5 rooms, all supplied with modern conveniences. There is also a store and a club house. A short distance below the camp is a hot spring equipped with a bath house for the convenience of the employes. Near by is also a copious fresh water spring, which is pumped into a tank set on the side of the hill above the town, and the water is from here carried by pipes to the different houses. The location and equipment of the mine are in every way conducive to profitable mining, and calculated to insure the comfort and safety of the miners.

GUNNISON COUNTY.

THE SOMERSET MINE.

This mine is situated 11 miles northeast of the town of Paonia, on the north fork of the Gunnison river. It is owned and operated by the Utah Fuel Co. In the vicinity of the camp the valley is narrow and irregular in its course, but having a general

bearing of nearly due east and west. Both sides of the valley ascend abruptly, attaining a vertical height of about 1800 feet above their base, and are composed of Laramie and Tertiary measures. The surface for miles surrounding is profusely strewn with dark scoriaceous boulders, having been transported by floods from volcanic districts some 40 or 50 miles above. The seam under exploitation is 22 feet thick; this is the second in geological order above the basal sandstone, and is separated from the first (lower seam), which is 4 feet thick, by 27 feet of strata. The measures are pitching about 6 per cent.

The mine is opened by a slope entering upon the croppings of the vein near the foot of the mountain on the north bank, and about 600 feet from the river. Length of slope, 2,000 feet, with an average width of 12 feet, and 8 feet high, driven nearly on the dip of the vein. Eighty-four feet to the right of the slope is a parallel air-course, which is also used as a man-way, and has a sectional area equal to that of the slope. The method of mining is a "double entry room and pillar." Cross entries are turned on both sides of the slope at intervals of 400 to 500 feet, and are driven nearly on the strike of the seam, allowing sufficient rise to facilitate the haulage and drainage. All rooms are worked to the rise, 24 feet wide, with 40-foot pillars, and the mining is done by blasting and pickwork.

Primary hauling is done by horses; the cars have a capacity of 3¼ tons, and are delivered on to the double partings near the mouth of the entries, whence they are further conveyed through the slope to the surface by means of an "engine plane" rope haulage.

Ventilation is created by a 6x18-foot Cole fan erected to either exhaust or force, and capable of producing 52,000 cubic feet per minute at 40 revolutions, which quantity could be doubled if necessary. The main volume is divided into four splits, one for each level and the quantities regulated proportionate to the number of men and special requirements in each respective division, and the current is judiciously conducted through the workings.

For sprinkling purposes all the roadways are provided with a pipe line, carrying water under pressure of 35 to 40 pounds, by the aid of which every accessible point in the workings, including even props, doors and canvases, are regularly sprinkled and kept in a permanent state of humidity. Such a thorough system of watering by reducing the temperature and removing the dust particles from the air, improves the sanitary condition and adds materially to the comfort of the men, besides eliminating the danger incident to dust-laden atmosphere in mines. Although very little explosive (CH^4) gas has been detected in the mine, the workings are carefully examined by a fire boss every morning before the men enter. Naked lights are used exclusively.

The coal is of non-coking character, and is a good fuel for domestic as well as steam purposes. Their principal market is the towns, farming and horticultural regions of Delta and Montrose counties, and the metalliferous camps tributary to the Denver & Rio Grande narrow gauge railroad, with which the mine is connected by a forty-mile branch from Delta.

The daily output is restricted to an average of about 700 tons, to suit the yet limited market, but the mine is equipped to handle 2,000 tons per day, which could be reached on short notice once the demand justified.

Somerset camp is situated a few hundred yards west of the mine on a slightly inclined and elevated area north of the river. It consists of a large store and post office, hotel, club house and fifty dwelling houses, built in different styles and sizes, to accommodate the requirements of the tenants. All the buildings are of frame, and substantially constructed with modern conveniences. The water for domestic purposes is supplied by a system of pipes connected to a reserve tank 50,000 gals. capacity situated on the side of the hill about 500 feet vertically above the town, and piped to hydrants placed at convenient points to the houses.

This mine and camp have been laid out and equipped with a view of not only operating the mine in the most advanced manner to insure good financial results, but also to promote the health and safety of the employes. The homes of the employes were given humane consideration, and the families of the miners enjoy cheerful and comfortable surroundings.

CRESTED BUTTE MINE.

In 1903 a Capell fan was put in at the Crested Butte mine, replacing one of smaller capacity and largely increasing the air volume. This new fan generates a current of 75,175 cubic feet per minute at 2 inches water gauge.

HUERFANO COUNTY.

The coal-bearing beds contained in this county occupy the northern division of the Raton field. The productive seams under operation, which are four in number, are embedded in the lower 300 feet of the Laramie, and they range in thickness from $3\frac{1}{2}$ to 7 feet.

The mining in Huerfano county is concentrated chiefly to a marginal strip along the eastern crop-line of the deposits. Although the product of the entire district is of semi-coking type, chemical analyses show a noticeable variance of composition to exist between the coals of the different mines. It is highly adapted for domestic purposes, but a considerable proportion of the output is used also for steaming, and the coal is in great demand, particularly during fall and winter.

The territory adjacent to and lying northeast of the town of Maitland is now a scene of great mining development. Four new mines are being opened, and an eight-mile extension of the

joint track C. & S. and D. & R. G. railroads from Maitland is being constructed to the properties, to furnish shipping facilities for the producers. Some of these mines are intended for a large capacity, and the energizing of the latent resources contained in this new district will prove a stimulating factor for the business interests of the community.

BLACK CANON MINE.

This mine is situated about one mile from Maitland, operated under a lease by B. F. Wilson, of Denver. It is opened by a slope driven on the dip of the vein which is 3 feet thick, but divided near its center by several inches of slate. This slate gradually diminishes in thickness with increased depth, and a drill hole some distance in advance of the present workings indicates that the rate of its thinning is very rapid.

PINON MINE.

This property is located two miles northwest of the "Black Canon." It is owned and operated by the Rocky Mountain Fuel Co. It is opend by a slope entering at the outcrop of the vein, which is 4 feet 8 inches thick, separated into two benches by 6 inches of argillaceous slate, 3 feet from the bottom. The encouraging feature of the interstratified slate band diminishing in size with greater depth is noticeable also at this mine. Dip of formation is 4%, present length of slope about 500 feet.

CONSOLIDATED COAL CO.

This company is opening a mine on the property adjacent to the "Pinon" on the north, and is situated a half a mile from the latter. The extent of the opening, thickness and structure of the vein and other conditions in general are similiar to those of the Pinon.

SUNNYSIDE MINE.

The last of the mines of this new group is the Sunnyside, situated about 7 miles from Maitland, at the northern extremity of the field. Here the line of outcrop of the coal measures makes a sharp turn from its long continuous northwest course to a little south of west, and the formation assumes a greater degree of pitch.

This property contains 320 acres of choice land, owned and operated by the Sunnyside Coal Co., of which Mr. M. W. Strong, of Denver, is manager. The seam under exploitation is 7 feet thick, with sand rock roof. In general structure and geological position, it compares favorably with the "Walsen" vein of the Walsenburg district, but in luster and fracture it differs considerably from the latter; in some respects it possesses a conspicuous similiarity to the Canon City product.

The mine is opened by a slope driven slightly across the pitch of 13 degrees. The present output is hauled by teams to Sunshine, a distance of over 8 miles, at which point it is trans-

ferred on board of railroad cars. Thirty men are employed in and around the mine, developing and making preparations for the arrival of the railroad, which is expected to be ready in January, 1905.

THE BLACK DIAMOND MINE.

In compliance with our demands for better ventilation, the Cedar Hill Coal & Coke Co. has recently put in a 12-foot fan at the above-mentioned mine, which is located near Bunker Hill station. Heretofore the mine was ventilated by a furnace, the supplanting of which by a fan will increase the volume of air and improve the sanitary condition of the workings considerably.

JEFFERSON COUNTY.

THE LEYDEN MINE.

This mine is owned and operated by the Leyden Coal Co., and is situated 16 miles northwest of Denver, in Jefferson county. It is opened by two vertical shafts 350 feet apart and 675 feet deep, both timbered "skin to skin" their entire depth. The property comprises 960 acres of land, all of which, as far as it has been possible to determine by numerous bore-holes, is believed to be underlain with workable coal. Sinking of the air-shaft commenced late in 1902, and the coal was struck in February, 1903. After doing some development work and finding the seam to conform with the drill-holes' record, as regards thickness and cleanness, excavating began on the main shaft, which was started April, 1903, and completed in November the same year.

The main shaft is timbered with 8x12-inch sawed pine, and contains three compartments, two 5 feet 10 inches by 8 feet for hoisting purposes, and one 4 feet 4 inches by 8 feet, which is used for the passage of wire and pipe lines for the transmission of power to the workings.

The air-shaft has two compartments, 5 feet 3 inches by 6 feet 9 inches, and 3 feet by 6 feet 9 inches, respectively, timbered with the same quality of material as that used for the main shaft, and is equipped with a single cage which was used to hoist coal while the latter was being sunk.

Average thickness of the seam is 9 feet, and the coal, like all other produced in the South Platte field, is of the lignite class, and in character resembles the Boulder county product. Being free of soot and clinkers, it makes a very desirable and economical fuel for domestic and stationary steam purposes. The vein lies practically horizontal, but is slightly disturbed occasionally by gentle undulations, which is a characteristic peculiar to all flat veins in the Rocky Mountain region. The roof consists of argillaceous shale, which is rather resistless to weight, and to promote the safety of the employes, as well as to minimize the expense incidental to excessive timbering, the

upper two feet of the vein is left in over all the entries and some of the rooms, to support the roof.

Mining is conducted on the room and pillar system. The shaft pillar has an area of about 600 feet square. Main entries are separated from their parallel air-courses by 70-foot pillars, and are driven square on the face cleats. Cross entries carry 60-foot pillars and are turned at right angle to the main at intervals of 500 feet, thus allowing a 250-foot run for the rooms, which are turned 40 feet apart, and which distance is equally divided between each room and its pillar.

All the mining is done by electric chain and compressed air punching machines. Ventilation is furnished by a Duncan 15-foot diameter fan, whose buildings are covered by galvanized sheet iron as a preventative against fire, and the fan casing is so erected that, in the event of a mine fire or any other emergency, the air current can be reversed at will. The fan is driven by a 10 by 14-inch steam engine, and produced during my last inspection 95,000 cubic feet of air per minute, which total volume is divided at the foot of the down-cast into two nearly equal splits, and each side of the mine is ventilated independently of the other. Great care is exercised in properly conducting the air currents through the workings, and it is the intention of the mine officials to make additional splits as often as future conditions require it. Particular attention is also given to the watering of the roadways, which are regularly sprinkled and kept in a desirable state of humidity.

Although the seam is deeply buried beneath the surface, no trace of explosive gas (CH^4) has yet been found in the mine, and another feature favorable to economical operating is that the quantity of water it generates is comparatively small, but, to be prepared for an increased flow, the mine is equipped with two 12x4x12 inch Duplex Jeansville pumps.

Pit cars are made of steel plate, weight 2,000 pounds, capacity 4,000 pounds. At present the hauling is done by mules, but these will be supplanted by electric locomotives. Power and steam plant of the main shaft consists of a double 20x42-inch first-motion hoisting engine, with a 6-foot diameter drum, made by the Vulcan Iron Works Co., 100 K. W. "General Electric" generator driven by a 16x16-inch Ball automatic engine belt connection; one 22x26-inch Leyner air compressor; six 5½x18-foot horizontal tubular high-pressure boilers. Cages are self (automatic) dumpers, and are fitted with modern safety devices, including overwinding detaching hooks and safety catches. Ropes used are 1⅛-inch diameter extra strong Roebling, 19 wires to the strand, and 7-foot diameter sheaves. Top and bottom are connected by both bell signal and telephone. Equipments at the air-shaft consist of a 14x16-inch second motion hoisting engine, 5-foot-diameter drum and a 1-inch rope, two 5x16-foot tubular boilers.

The plant is designed for a daily capacity of 2,000 tons, and no doubt, when the mine is fully developed, this amount can be obtained. Present daily output is 800 tons, and is increasing continually.

Much credit and praise is due the management for the enormous amount of work accomplished in so short a period of time, and the careful and intelligent manner in which it has been conducted. All that money and skill can bring to bear towards promoting the health and guard against danger to limb and life of the employes, is being done.

The mine is connected with the Denver-Northwestern Electric Line, and also with the Denver-Northwestern & Pacific (Moffat) Railroad by a two-mile spur to Leyden Junction. Attached is a diagram showing thickness and character of strata passed through in the Leyden shaft, made especially for this department by Mr. J. G. Perry, superintendent.

LAS ANIMAS COUNTY.

This county embraces the southern, and by far the most important, division of the Colorado portion of the Raton field. As a coal producer it still maintains supremacy over the other counties of the State by a wide margin. Ninety-five per cent. of its coal is of the coking variety, and the coke manufactured, being of excellent grade commands a steady market, and hence the mines are kept comparatively busy nearly the year round.

The veins under exploitation are from 3½ to 9 feet in thickness. In some sections of the county as many as seven workable veins have been discovered, all of which are contained in the lower 900-foot of the Laramie measures, and are separated into three groups by intervals of 270 feet, and 160 feet of barren formation.

In the southern districts of this division the measures lie nearly horizontal, but the inclination slightly increases northward, varying in different localities from 3 to a maximum of about 10 degrees, dipping southwesterly.

GREEN CANON MINE.

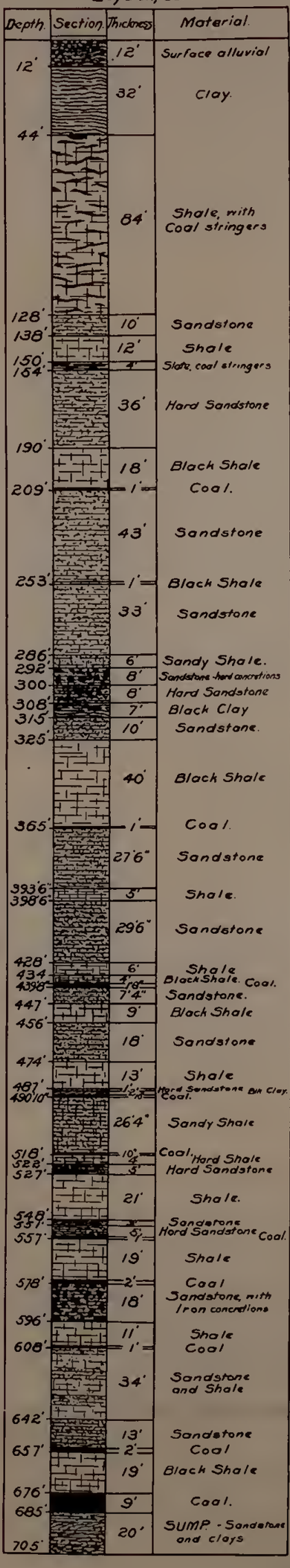
This mine is opened on the property adjacent to that of the Brodhead mine. It lies about 2½ miles north from the town of Aguilar, and near the head of one of the many ravines tributary to the Apishapa valley. It is operated by the Green Canon Coal Co. The plant consists of three openings, viz.: two drifts and one slope, all entering at the out-crop of the coal. The two veins under operation belong to the middle group, and are stratigraphically 68 feet apart, and are 4 feet and 5 feet 8 inches thick, respectively. Ventilation is effected by a 12-foot fan, producing 20,000 cubic feet per minute. Railroad connection is by a two-fifths mile extension of the C. & S. Railroad from the Brodhead

Formations Encountered

in sinking No. 1 Shaft of

The Leyden Coal Co.

Leyden, Colo



A.J.H.

tipple. Shipping commenced in February, 1903. The long period of inactivity caused by the recent strike greatly retarded the development work, but it is expected that the daily output will reach the 500 ton mark before spring. The product is of high grade for steam and domestic purposes.

DELAGUA MINE.

Of all the new mines opened in the State during this biennial period, the Delagua is yet the most extensive in its development and output. It is operated by the Victor Fuel Co., and is situated in a small valley or canyon three miles westward from Hastings. Developments are in progress on both sides of the valley, and the deposit is attacked by a slope and three drift openings, all working the same vein, which is geologically a member of the upper "group." It has an average thickness of 6 feet, and an inclination of 3 degrees. Near the mine and on a plane with the main openings is a trestle from 500 to 600 feet long, extended across the bottom of the canyon, and two tipples are located near the middle of this trestle. The tipples are arranged one for each side, and are equipped with the most modern conveniences, and capable of handling 4,000 tons per day of 10 hours. Hauling is done by electric locomotives; those used in the drift workings are of the 10-ton traction, Goodman Manufacturing Co. type, and in the slope a six-ton class B-B, 3d rail, Morgan Electric Manufacturing Co., is used. Notwithstanding the fact that the mine is now well ventilated, an 8x14-foot Capell fan, capable of delivering from 150,000 to 200,000 cubic feet of air per minute, is in course of construction. This new fan is to replace another which is now in use, but it is of much less capacity. It is the intention of the officials, when this new ventilator is ready for action, to divide the main air volume into splits to suit the requirements of the various districts. The haulage ways are regularly sprinkled and kept in a state of humidity, and the mine is absolutely non-gaseous. Steam and power plants consist of two 250-horsepower Wickes vertical-tubular boilers, two 100 K. W. Goodman Manufacturing Co.'s multipolar-generators, driven driven by two 18x18-inch McEwen high-speed engines. Eighty coke ovens have been built, and material is already on the ground for the construction of eighty more in addition. Adjacent to the tipple is a washer of 350 tons capacity. Shipping commenced January, 1903, and railroad connection is via C. & S. E., which joins the C. & S. and D. & R. G. railroads at Hastings.

GREENVILLE MINE.

The Cedar Hill Coal & Coke Co. owns this property, and put it in operation Septetmber, 1903, having now a daily capacity of 500 tons. It is situated in Road Canyon, about one and one-half miles southwesterly from Ludlow. The vein has an average thickness of 5 feet 7 inches of bituminous character, and possessing excellent coking properties. It is opened by a drift enter-

ing where the vein outcrops on the hillside, and is connected with the Berwind branch of the C. & S. Railroad by an 800-foot gravity plane. The mine is ventilated by a 10-foot-diameter W. E. Cole fan, delivering 40,000 cubic feet per minute, this volume of air is effectively conducted through the workings.

FORBES NO. 5 MINE.

In the summer of 1904 the Chicosa Fuel Co. opened a new mine known as No. 5, on the north side of Chicosa canyon, two miles from Forbes Junction, and about 10 miles northward from Trinidad. A branch of two miles of the C. & S. Railroad has been constructed to the property. The seam under exploitation is 6 feet thick, and is free from impurities, and the product ranks with the highest grade of any in the field for steam and coking purposes. The openings consist of two parallel entries penetrating the hillside on the seam's out-crop, and about 230 feet vertical, above the base of the canyon. Ventilation is produced by a temporary furnace. A gravity plane 1,166 feet long and a 11½ degree pitch is used to lower the coal from the mine to the tipple. The mine is yet in its infancy, and its present capacity per day is 400 tons, which output is expected to be more than doubled in the next six months. All the construction and development work was done under the direct supervision of Joseph Cox, Majestic, Colorado, who is now general superintendent for the company.

SUFFIELD MINE.

This property is owned and operated by the Suffield Coal Co. It lies about 7 miles north from Trinidad, and its railroad connection is by a spur from the C. & S. R. R. Shipping commenced February, 1904. There are two veins under operation, both belonging to the lower "group," and are 4 feet and 7½ feet thick, respectively, and geologically separated by 50 feet of intervening strata of sandstone and shale. The openings are located on the east front of the "bluff" formed by the eastern crop line of the basal coal measures, and they consist of two parallel drifts on each seam. The ventilation is effected by means of furnaces, but these are to be replaced by fans in the near future. An aerial wire rope tramway, impelled by the force of gravity, is used to convey the coal from the mine to the railroad. It is the first introduction of this method of haulage to the coal mines in Colorado, and when installed it was intended for a capacity of 1,000 tons per day, but the maximum daily output that it has been able to handle has not yet exceeded 400 tons. The tramway is 3,100 feet long, and the upper chute, which is located near the mine, has an elevation of 550 feet above the railroad tipple. While in motion, the speed of the tramway is three miles per hour, and the tubs used, of which there are 32, have a capacity of 1,000 pounds each.

VALLEY MINE.

This mine is located on the south bank of the Purgatoire river, about 5 miles west of Trinidad. It is operated by the Valley Fuel Co. Work commenced early in 1904 by sinking an 8x8-foot prospect, or air-shaft, which struck the vein at a depth of 85 feet. Finding the vein to corroborate with the drill hole records as to thickness and otherwise, work was then immediately started on the main shaft, which is 8x16 feet, three compartments, and 75 feet deep. The property is underlain by two workable veins, lying nearly horizontal, and separated by 85 feet of strata. The one under exploitation is 5½ feet thick, and the other varies from 3½ to 4 feet, and crops in the front of the bluff near the top of the air-shaft. Ventilation is effected by a 5x16 foot fan, erected so as to either force or exhaust, and producing a good volume of air at a moderate speed. The mine generates marsh gas (CH^4), but the air currents are so effectively conducted through the workings that they are kept free of any accumulations of the explosive element, and naked lights are used exclusively. Developments so far have been confined to entry driving, and the present daily output is 150 tons, but it is expected to increase rapidly from now on. The cages used are self-dumping, and the hoisting and tipple appliances are capacitated for a comparatively large tonnage. Railroad connections are the Colorado & Wyoming and C. & S.

THE CUATRO MINE.

This mine is situated in the South Fork District of the Purgatoire river, 3 miles west of Tercio, and 34 miles in the same direction from Trinidad. It is owned and operated by the Colorado Fuel & Iron Co., and was opened in the spring of 1903. Shipping commenced in June of the same year. A two-mile extension of the Colorado & Wyoming Railroad was built from Tercio to the tipple, which is located 6,069 feet from the mine, and which distance is covered by an endless-rope haulage. The two seams mined are 4½ and 5 feet thick, and are separated by about 25 feet of intervening strata, dipping 13 degrees in the opposite direction of the drainage.

The mine is located in a narrow canyon, and is opened by four drifts, two on each side of the canyon, and a slope Practically all the output of 500 tons per day is taken from the drift openings, and the area assigned to these lies between their main levels and the outcrop, a distance varying from 800 to 1,500 feet, but unlimited laterally. All the coal lying to the dip of these levels will be extracted through the slope, as this, although now only 800 feet in depth, will eventually be the main producer, as an enormous territory lies tributary to it forward and on both sides. Surface indications show that, at a distance of about a half a mile ahead of the slope, the measures assume a horizontal

position, which is maintained for some distance, whence they begin to rise gently in the opposite direction, and continue so for one and a half to two miles. With such natural facilities and the comparative freedom of the area from dykes and dislocations, the Cuatro mine is destined for a large daily output and long duration.

Ventilation is furnished by furnaces so arranged as to get the assistance offered by the natural conditions due to the difference of elevation between intakes and outlets. Although the mine is fairly ventilated, this method is to be supplanted by a Capell fan in the near future.

The coal is mined by blasting, and the shots fired by a "shot-lighter," when all the miners have withdrawn from the mine. So far the mine is absolutely non-gaseous. Here, also, the strike retarded the growth and development of the mine.

THE PRIMERO MINE.

In the summer of 1903 the Colorado Fuel & Iron Co. put in a 14-foot Capell fan at the above mine, which increased the air volume over 100 per cent. The fan produces, at 200 revolutions and 1.2″ water gauge, 134,425 cubic feet per minute.

WELD COUNTY.

During the last two years the prairie region lying imme diately northeast of Erie has been marked by an increased activity in prospecting and opening up small mines. This comparatively virgin portion of the South Platte field occupies an area of 8 to 10 miles square in the southwest corner of the county. It is bounded on the west by the Denver and Lyons branch of the B. & M. Railroad and on the east by the U. P. Railroad. A large proportion of the western half of the district has been proven, by bore-holes and numerous openings, to contain two workable veins of coal varying from 4½ to 13 feet in thickness, and at a maximum depth of about 210 feet below the surface. The measures lie nearly level and the general conditions are favorable to profitable mining. The eastern half, as far as prospecting has demonstrated, is less productive, although two seams of 3 and 4½ feet have been found at several points, but borings have shown that they lack general uniformity of thickness, and that the workable beds occur in scattered areas, intervened by thinnings of varying degree and extent.

RELIANCE MINE.

Of the four new mines opened during the above mentioned period of time, the Reliance mine is so far the most extensively developed. It is owned and operated by Thomas Wooley & Sons, and is situated 1¾ miles northeast of Erie, on the Brighton and Boulder branch of the U. P. Railroad, with which it is connected.

fectly clean. Thirty feet below is the second seam, which has a thickness of 4 feet, and is shown by drill record to be also free from impurities. Present daily capacity is 150 tons.

SUMMIT MINE.

This mine is situated 2½ miles northeast of the Reliance, and is owned by T. Morgan & Co., of Erie, and opened by a shaft of 89 feet in depth. The coal was struck in October, 1904. The vein is 10 feet thick and has a slight dip to the southeast. It is expected that in the near future this mine will rank with the heaviest producers of the district.

BAUM-SAUNDERS MINE.

In 1903 the Baum & Saunders Company opened a prospect shaft 2 miles due east of the Summit mine, in which the two seams were found at depths of 91 and 195 feet, having a thickness of 11 and 7 feet 4 inches, respectively. The uper seam is interstratified by two bands of impurities 1½ and 2½ feet in thickness. No development has been done on the property beyond sinking the said shaft, which stands idle pending the construction of a branch of the U. P. Railroad, for which surveys have already been made. Plans and specifications are drawn for the opening and equipping of a mine of large capacity.

ANALYSES OF THE COALS.

Seams	Fixed carbon	Volatile matter	Ash	Moisture	Made by
Lower	50.09	32.88	4.40	12.40	H. E. Wood, Denver.

GEM MINE.

Is owned by Alfred Stevens & Co., of Erie, and is situated 1 mile northwest of the Reliance mine and about 200 yards east of the B. & M. Railroad. This mine is opened by a slope entering upon the croppings of the upper seam at the eastern margin of the district. Inclination of the measures is 6½ per cent.; thickness of the seam, 5½ feet. The mine is yet in its infancy and very little shipping is expected this winter.

The principal market for the mines of this district are the neighboring towns and farmers of Boulder, Larimer and Weld counties, to which points the product is hauled by teams direct from the mines.

LEHIGH MINE.

This mine is located in section 19, township 1, north range 68 west, and about 1 mile south of Erie, in Weld county. Here the coal-bearing measures contain three seams, having a thickness of 4 feet 3 inches, 5 feet 8 inches and 5 feet 11 inches, respectively, and are separated in the order given by 13 and 140 feet of intervening and nearly horizontal strata. The mine is opened by a vertical three-compartment shaft 120

feet deep to the middle (5 feet 8 inches) vein, and to which present operations are confined exclusively.

The shaft was sunk about five years ago by the Long's Peak Coal Company, who, after having driven the entries but a short distance from the shaft, ceased to operate, and consequently the mine remained idle for a period of several years. In the latter part of 1902 the property was transferred to the Northern Coal and Coke Company, and early in 1903 operations were resumed and developments were pushed with all possible energy.

An air-shaft was immediately sunk and a 12-foot Cole fan installed, which now ventilates the mine. The air-current is divided into two splits at the foot of the down-cast, and is judiciously conducted through the workings. The hoisting appliances are provided with safety devices, as per requirements of the law. The mine has a daily capacity of 500 tons, and is connected with the Brighton and Boulder branch of the U. P. Railroad at Erie.

TAPPING AN INUNDATED MINE.

In the adjoining property on the west is the old abandoned Mitchell mine, which was standing full of water. When within 300 feet of the boundary line of the northwest working of the Lehigh, a narrow entry with drill holes ahead and on both sides was driven towards the old workings, connection was made by one of the holes in the north rib, and the old mine was thus drained with success and perfect safety.

COAL ANALYSES.

BOULDER COUNTY.

Name of mine	Character of coal	Fixed carbon	Volatile matter	Moisture	Ash
Rex. No. 2.....	Lignite	46.25	33.6	15.4	4.2

FREMONT COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Brookside	Semi-bituminous....	51.72	35.05	8.23	5.00
Coal Creek.....	Semi-bituminous....	53.04	35.70	7.26	4.00
Rockvale	Semi-bituminous....	51.10	36.70	5.00	7.20

GUNNISON COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Crested Butte.....	Coking.....	56.93	37.23	1.79	4.05
Floresta	Anthracite.....	90.80	3.80	1.70	3.70

HUERFANO COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Pictou	Semi-coking.....	51.05	40.63	3.27	5.05
Hezron	Semi-coking.....	53.30	37.80	1.60	6.20
Robinson	Semi-coking.....	56.00	37.00	2.00	5.00

LAS ANIMAS COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Tercio	Coking.....	57.00	35.00	2.00	6.00
Sopris	Coking.....	58.40	32.18	0.52	8.90
Starkville	Coking.....	57.39	31.37	0.44	10.80
Berwind	Coking.....	54.81	39.20	1.24	4.75
Tobasco	Coking.....	53.26	38.05	1.04	7.65

LA PLATA COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Porter	Coking.....	58.00	35.9	1.4	3.8
Hesperus	Non-coking.....	53.7	40.1	2.3	3.9

PITKIN COUNTY.

Name of Mine	Character of Coal	Fixed Carbon	Volatile Matter	Moisture	Ash
Coal Basin.....	Coking.....	67.00	23.00	1.00	9.00
Spring Gulch.....	Coking.....	58.92	35.82	1.10	4.16

COKE ANALYSES.

Name of Mine	Fixed Carbon	Volatile Matter	Sulphur	Phosphorus	Ash
Crested Butte	98.010	1.510	.450	.030	9.000
Primero	82.680	1.540	.390	.150	15.240
Engle	82.000	1.398	.400	.002	16.200
Tobasco	81.670	1.400	.588	.002	16.340
Sopris	82.000	1.200	.550	.010	16.240
Starkville	82.600	1.330	.488	.002	15.850
Coal Basin	87.300	1.260	.650	.050	10.800
Spring Gulch	86.220	.930	....	....	12.820

Directory of Coal Mines.

DIRECTORY OF

BOULDER

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Simpson	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Mitchell	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Gladstone	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Hecla	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Rex No. 1	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Rex No. 2	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Gorham	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Industrial	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Acme	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Monarch	J. M. Mitchell & Son, Downer	J. M. Mitchell, Jr.	
Strathmore	Continental Fuel Co., Denver		
Clark No. 8	Clark & Murray, Gorham		
Sunnyside	Vesuvius Coal Co., Denver		
Tynon	The Marion Coal Co., Denver		
Matchless	Fox, Patterson & Evans, Louisville		
Fox	Fox & Patterson, Gorham		
Storrs	Rocky Mountain Fuel Co., Denver	E. E. Shumway	
Vulcan	Rocky Mountain Fuel Co., Denver		
Haywood	The Great Western Fuel Co., Denver		
Vaughn, now Maryland	The Maryland Land & Coal Co., Denver		
Standard	The Maryland Land & Coal Co., Denver		
Black Diamond	Kirkmeyer Bros. Boulder		
Shanahan	Kirkmeyer Bros. Boulder		
Rosser No. 7	Wm. Rosser, Gorham		
Marfell	Padfield Coal Co., Lafayette		
Crescent	Long's Peak Coal & Coke Co., Erie		

COAL MINES.

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
				C. & S.	
Henry Denman	246	Fan	90,000	B. & M.	
Henry Denman	86	Fan	30,000	B. & M.	
Henry Denman	23	Fan	15,000	B. & M.	
	74	Fan	20,000	C. & S.	
	136	Fan	80,000	C. & S.	
	147	Fan	30,000	C. & S.	
	65	Fan	25,000	C. & S.	
	85	Fan	16,000	C. & S.	
	95	Fan	20,000	C. & S.	Old mine reopened
	130	Fan	40,000	C. & S.	
W. H. Brown	56	Fan	30,600	C. & S.	
John Murray	2	Natural			
Jas. Mathews	6	Fan	7,000	C. & S.	Shut down
	..	Fan	12,000	U. P.	Shut down
D. E. Evans	70	Fan	6,000	C. & S.	
W. Fox	42	Natural	7,000	C. & S.	
	..	Fan		B. & M.	
	..	Natural		B. & M.	Shut down
Geo. Sparling	57	Fan	5,000	B. & M.	
	40	Natural		B. & M.	
	..			B. & M.	New opening
	15	Natural		None	
	6	Natural		None	
	4	Natural		None	
Wm. Padfield	8	Fan		B. & M.	
Charles Bergman	20	Fan	24,000	None	Old mine reopened

DELTA

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Juanita	Junita Coal & Coke Co., Paonia		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
H. Mallot.....	25	Furnace	10,000	D. & R. G.....	New mine

EL PASO

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt
Curtis	The Curtis Coal Mining Co., Colorado Springs		
Rapson No. 2	Rapson Coal Mining Co., Colorado Springs		
Danville	Pike's Peak Coal Co., Colorado Springs		
Pikeview	Pike's Peak Coal Co., Colorado Springs		
Austin Bluffs	Austin Bluffs Coal Co., Colorado Springs		
Williamsville	Monument Valley Coal Co., Colorado Springs		
Tudor	Tudor Coal Co., Colorado Springs		
Franceville	Joseph M. Cell, Colorado Springs		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
Ralph Wooden	80	Fan	12,000	A., T. & S. F.	
Ralph Wooden	40	Fan		R. I.	
James Comisky	69	Fan	21,000	A., T. & S. F.	
Peter L. Dixon	75	Fan	21,000	D. & R. G.	
Thomas E. Thomas	34	Natural	10,000	None	
O. B. Bennett	20	Natural	1,715	A., T. & S. F.	
. . .	12	Natural		None	
. . .	3	Natural		None	

FREMONT

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Brookside	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Rockvale	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Coal Creek	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Fremont	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Nonac	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Chandler	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Magnet	Rocky Mountain Fuel Co.	E. E. Shumway	
Bluff Springs	Phillip Griffith		
Royal Gorge	Royal Gorge Coal & Fire Clay Co., Canon City		
Cuckoo	Great Western Coal Co., Canon City	F. D. Heath	
Peanut	Williamsburg Slope Coal Co., Williamsburg		
Williamsburg	Williamsburg Slope Coal Co., Williamsburg		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M	Railroad connections	Remarks
David Griffiths	66	Fan	24,800	A., T. & S. F.	During the
Henry John	257	Fan	30,600	A., T. & S. F.	year 1904 the
Ben Beach	117	Fan	26,800	D. & R. G.	Colorado Fuel
Robert McAllister	130	Fan	27,000	A., T. & S. F.	& Iron Co.
B. S. Davies	53	Fan	11,800	A., T. & S. F.	was known
J. B. William	193	Fan	13,600	D. & R. G.	as the Rocky
M. M. Walsh	110	Fan	20,000	A., T. & S. F.	Mountain
Phillip Griffith	30	Furnace		None	Coal & Iron
E. G. Bettis	40	Natural			Co.
Robert Nicholls	36	Fan and furnace	6,500	None	
S. P. Smith, Jr.	12	Natural	5,120		
S. P. Smith, Jr.	18	Natural	5,000		

GARFIELD

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Coryell	Garfield County Coal & Fuel Co., Newcastle		
Sunlight	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas
South Canon	Boston-Colorado Coal Co, Glenwood Springs	E. E. Eglee	
Midland	Rocky Mountain Fuel Co., Denver	E. E. Shumway	
Pocahontas	Pocahontas Coal Co., Pocahontas		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
Dom. Zullo	34	Fan	20,000	C. M.	
	..	Fan			Abandoned
S. W. Price	65	Fan	55,000	C. M.	
Chas. J. Coryell	45	Fan	15,000	C. M.	
Jno. W. Cummins	32	Fan	12,600	C. M.	

GUNNISON

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Crested Butte	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas
Anthracite	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas
Floresta	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas
Alpine	Continental Fuel Co., Denver	M. S. Donnelly	
Somerset	Utah Fuel Co., Salt Lake, Utah	H. G. Williams	

COUNTY

Local Superintendent	No of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
A. Alexander	197	Fan	46,800	D. & R. G.	
George Shields	41	Fan	25,000	D. & R. G.	
John W. Allen	66	Fan	31,800	D. & R. G.	
Joe Watson	121	Fan	40,600	C. & S.	
Robt. L. Fowler	117	Fan	46,000	D. & R. G.	New mine

HUERFANO

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Pictou	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Robinson	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Walsen	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Rouse	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Hezron	Colorado Fuel & Iron Co., Denver	John T. Kebler	Joe Ball
Maitland	Victor Fuel Co., Denver.	G. F. Bartlett	D. M. Simpson
Pryor	Union Coal & Coke Co., Denver	J. M. Bowen	
Champion	Union Coal & Coke Co., Denver	J. M. Bowen	
Toltec	Northern Coal & Coke Co., Denver	J. D. Skinner	J. C. Williams
Midway	H. C. Nicholls & Co., Pryor	H. C. Nicholls	
Rugby	Rugby Coal Mining Co., Denver	J. M. League	
Sweet	The Silver State Coal Co., Denver		
Sunnyside	Sunnyside Coal Mining Co., Denver	M. W. Strong	
Pinon	Rocky Mountain Fuel Co., Denver	E. E. Shumway	

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M	Railroad connections	Remarks
Goe Phipps	146	Fan	50,000	D. & R. G. and C. & S.	
R. K. Graham	134	Fan	32,500	D. & R. G. and C. & S.	
R. K. Graham	183	Fan	33,600	D. & R. G. and C. & S.	
M. T. Brenan	208	Fan	20,160	D. & R. G. and C. & S.	
J. P. Breen	94	Furnace	12,500	Colo. & Wyo.	
W. Armstrong	221	Fan	15,500	D. & R. G.	
Jno. Calderhead	100	Fan	25,000	D. & G. R. S. and C. & S.	
Thomas Caddel	47	Fan	18,000	D. & G. R. S. and C. & S.	
Geo. Fruith	91	Fan	30,000	D. & R. G. and C. & S.	
. . .	85	Fan	18,000	D. & R. G.	
L. C. Miller	112	Fan	25,000	D. & R. G. and C. & S.	
Jno. McDowell	70	Air shaft and furnace	14,000	D. & R. G. and C. & S.	New mine
. . .	35	Natural		None at present	New mine
Thomas Morgan	15	Natural		D. & R. G.	New mine

JEFFERSON

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Leyden	The Leyden Coal Co., Denver	S. M. Perry.....	

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume Air in Cubic Ft. Per M.	Railroad Connections	Remarks
J. G. Perry.....	185	Fan	80,000	D. & N. W.....	New mine

LAS ANIMAS

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Primero	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Starkville	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Sopris	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Engle	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Berwind	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Tobasco	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Tercio	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Cuatro	Colorado Fuel & Iron Co., Denver	John T. Kebler	Robert O'Neil
Hastings No. 1	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Hastings No. 2	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Hastings No. 3	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Delagua No. 4	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Delagua No. 5	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Delagua No. 6	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Delagua No. 7	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Gray Creek	Victor Fuel Co., Denver	G. F. Bartlett	D. M. Simpson
Bowen	Union Coal & Coke Co., Denver	J. M. Bowen	
Majestic	Continental Fuel Co., Denver	M. S. Donnelly	
Bloom	Jeffreys & Co., Trinidad		
Brodhead	Las Animas Coal Co., Denver	Ed. Prentis	
La Belle	Rocky Mountain Fuel Co., Denver	E. E. Shumway	
Piedmont	Rocky Mountain Fuel Co., Denver	E. E. Shumway	
Primrose	Primrose Coal Co., Rugby		
Green Canon	Green Canon Coal Co., Denver	H. Van Mater	
Black Diamond	Cedar Hill Coal & Coke Co., Denver	H. W. Anderson	
Greenville	Cedar Hill Coal & Coke Co., Denver	H. W. Anderson	
Ludlow	Huerfano Coal Co., Denver		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
W. Morgan	341	Fan	134,425	Colo. & Wyo.	
G. J. Johnson	244	Fan	22,900	A., T. & S. F.	
J. S. Thompson	269	Fan	34,560	D. & R. G., C. & S. and Colo. & Wyo.	
A. Jacobs	258	Fan	36,000	D. & R. G.	
John Jennings	319	Fan	48,000	D. & R. G. and C. & S.	
James G. Young	170	Fan	26,000	D. & R. G. and C. & S.	
B. J. Matteson	247	Fan	91,300	Colo. & Wyo.	Six openings
W. McDermott	94	Fan	18,000	Colo. & Wyo.	
D. E. Davies	132	Fan	27,000	C. & S. E.	
D. E. Davies	425	Fan	104,000	C. & S. E.	
D. E. Davies	..	Fan	.....	C. & S. E.	Shut down
G. J. Jewett	143	Fan and natural	20,000	C. & S. E.	New mine
G. J. Jewett	218	Fan	20,000	C. & S. E.	New mine
G. J. Jewett	185	Fan	20,000	C. & S. E.	New mine
G. J. Jewett	76	Natural	.....	C. & S. E.	New mine
John Evans	319	Fan	40,800	C. & S.	
Adam Turner	80	Fan	41,000	D. & R. G. and C. & S.	
O. C. Cook	168	Fan	37,000	C. & S.	
Geo. Jeffreys	25	Natural	.....	None	
Eph. Nesbit	178	Fan	21,000	C. & S. and D. & R. G.	
F. D. Mitchell	35	Furnace	10,000	C. & S.	
John B. Hutchinson	190	Fan	60,000	Colo. & Wyo.	New mine
Robt. Wyp	94	Fan	9,000	C. & S.	
Tom Bradley	75	Fan	20,000	C. & S.	New mine
Jas. B. White	55	Furnace	9,000	C. & S.	
Joe Smith	100	Fan	40,000	C. & S.	New mine
G. R. Hill	70	Furnace	8,800	D. & R. G and C. & S.	New mine

LAS ANIMAS

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Forbes No. 5	Chicosa Coal Co., Majestic.		
Jewell	Northern Coal & Coke Co., Denver		
Southwestern	Northern Coal & Coke Co., Denver		
Valley	Valley Fuel Co., Trinidad		
Stevens	J. J. J. Abercrombie & Co., Trinidad		
Haigh	Trinidad Coal Co., Trinidad	Wm. Haigh	
Wootten	Turner Fuel Co., Trinidad		
Suffield	Suffield Coal Co., Aylmer		

COUNTY—Concluded.

Local Superintendent	No of Employes	Mode of Ventilation	Air in Cubic Ft. Per M.	Railroad connections	Remarks
Joseph Cox	90	Furnace	5,000	C. & S.	New mine
. . .	15	Furnace	.....	C. & S.	
. . .	17	Furnace	.....	C. & S.	
A. M. Oliver	40	Fan	14,000	Colo. & Wyo. and C. & S.	New mine
. .	15	Air shaft	.....	.....	
. . .	..	.....	.....	.....	
Jno. MacLiver	10	Furnace	375	A., T. & S. Fe	
Donald Cameron	25	Furnace	16,000	D. & R. G. and C. & S.	New mine

LA PLATA

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Porter	Porter Fuel Co., Durango		
Hesperus	Porter Fuel Co., Durango		
Ute	Ute Coal Co., Durango		
City	Cold King Consolidated Mines Co., Durango		
Champion	Gold King Consolidated Mines Co., Durango		
Perin's Peak	Boston Coal & Fuel Co., Durango		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Air in Cubic Ft. Per M.	Railroad connections	Remarks
Thos. Mason	84	Fan	35,000	R. G. S	
Wm. Mason	66	Fan	40,000	R. G. S	
C. C. Hauser	15	Furnace	7,000	R. G. S	
Geo. C. Logan	48	Natural	8,000	D. & R. G	
Geo. C. Logan	30	Natural	7,500	D. & R. G	
. . .	40	Natural	17,000	R. G. S	

MESA

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Book Cliff	Book Cliff R. R. Co., Grand Junction	W. S. Phillips	
Cameo	Grand Junction Mining & Fuel Co., Grand Junction	P F. Sharp	
Stokes	Walter Stokes, Palisade		
Palisade	Palisade Coal & Supply Co., Palisade		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad Connections	Remarks
. . . .	5	Natural	.....	Book Cliff	
. . . .	50	Natural	9,000	D. & R. G. and Colo. Midland	
Walter Stokes.....	6	Furnace	12,500	.....	
Geo. Clark.....	35	Natural	8,000	C. M. and D. & R. G.....	

MONTEZUMA

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Mancos	Geo. S. Spencer, Mancos		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad Connections	Remarks
. . . .	5	Natural	.....	None	

PITKIN

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Spring Gulch	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas
Coalbasin	Colorado Fuel & Iron Co., Denver	John T. Kebler	J. P. Thomas

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
Tim Tinsley	126	Fan	40,500	C. M.	
John Shaw	121	Fan	64,000	C. R.	

WELD

Name of Mine	Name and Address of Operator	General Mgr.	Division Supt.
Garfield	Garfield Fuel Co., Denver		
Lehigh	Northern Coal & Coke Co., Denver		Henry Denman
Whitehouse	John Alderson, Erie		
Reliance	Thos. Woolley, Erie		
Emerson	Smith Bros., Ft. Lupton		
Washington	David Brimble, Erie		
Eureka	The Eureka Coal Co., Rinn		
Davies	Davies Coal Co., Longmont		

COUNTY

Local Superintendent	No. of Employes	Mode of Ventilation	Volume of Air in Cubic Ft. Per M.	Railroad connections	Remarks
Joe Simpson	50	Fan	11,461	U. P.	
	67	Fan	25,000	U. P.	New mine
	18	Fan	7,500	None	
	30	Fan		U. P.	
	4	Natural	5,000	None	
David Brimble	30	Fan	4,750	U. P.	
C. B. McKean	20	Fan	7,000	None	
Geo. Davies	16	Fan	7,000	None	

APPENDIX

THE STATUTE LAWS OF COLORADO IN RELATION TO COAL MINES

Coal Mines.

THE STATUTE LAW OF COLORADO IN RELATION TO COAL MINES, AS PASSED IN 1883, AND ACTS AMENDATORY THERETO.

Section 1. That the owner or agent of each coal mine or colliery in this State, employing ten or more men, shall make, or cause to be made, within six months after the passage of this act, an accurate map or plan of the workings of such coal mine or colliery, on a scale not exceeding one hundred feet to the inch, showing the bearings and distances of the workings, with the general inclinations of the stratum, and any material deflections in such workings, and the boundary lines of such coal mine or colliery, which shall be kept for the use of the Inspector, at the office of the said mine in the county where such mine or colliery is located, and which shall be kept up every three months; and shall also deposit a true copy of such map or plan with the Inspector of Coal Mines, and with the recorder of the county in which said coal mine or colliery is situated, to be filed in their respective offices; and said owner or agent shall cause, on or before the tenth day of January every year, a statement of the workings of such coal mine during the year past, from the last report to the end of the December month just preceding, to be marked on the original map or plan of said coal mine or colliery; Provided, If the owner or agent of any coal mine shall neglect or refuse, or for any cause fail, for the period of one month after the time prescribed, to furnish said map or plan as hereby required, or if the Inspector shall find, or have reason to believe, said plan or map is inaccurate in any material part, he is hereby authorized to cause a correct map or plan of the actual workings of such coal mines or colliery to be made at the expense of the owner thereof, the cost of which shall be recoverable from said owner by an action, as in cases of other debts, and shall cause a copy of the same to be filed in the office of the recorder of the county in which said coal mine or colliery is situated.

Sec. 2. It shall not be lawful, after six months from the passage of this act, for the owner or agent of any coal mine,

wherein over fifteen thousand square yards have been excavated, to employ or permit more than fifteen persons to work therein, except in opening shafts or outlets, unless there are to every seam of coal worked in each mine at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress or egress are always available to the persons employed in the mine, and air shafts, in which are constructed and maintained ladder-ways, shall be deemed and held to be an escape shaft within the provisions of this act, and no escape shaft shall be required; but it is not necessary for the two outlets to belong to the same mine; the second outlet need not be made until 15,000 square yards have been excavated in such mine, and to all other coal mines, whether opened and worked by shafts, slopes or drifts to such openings or outlets, must be provided within twelve months after 15,000 square yards have been excavated therein; and in case such outlets are not provided as herein stipulated, it shall not be lawful for the owner or agent of such mine to permit more than fifteen persons to work therein during each twenty-four hours. In case a coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein, and the owner thereof does not own suitable surface ground for another opening, he may select and appropriate any adjoining land for that purpose, and for approach thereto, and shall be governed in his proceedings in appropriating such land by the provisions of law in force providing for the appropriation of private property by corporations, and such appropriation may be made whether he is a corporator or not; but no land shall be appropriated under the provisions of this act until the court is satisfied that suitable premises can not be obtained by contract upon reasonable terms. Escapement shaft or other communication with a contiguous mine, as aforesaid, shall be constructed in connection with every vein or stratum of coal worked in such coal mine or colliery, as provided herein.

Sec. 3. In all cases where the human voice can not be distinctly heard, the owner or agent shall provide and maintain a metal tube from top to the bottom of the slope or shaft, or a telephone connection suitably adapted to the free passage of sound, through which conversation may be held between persons at the bottom and at the top of the shaft or slope; also, the ordinary means of signaling to and from the top and bottom of the shaft or slope; and in the top of every shaft shall keep an approved safety gate and an approved safety catch, and sufficient cover overhead on every carriage used for lowering and hoisting persons; and the said owner or agent shall see that sufficient flanges or horns are attached to the sides of the drum of every machine that is used for lowering and hoisting persons in and out of the mine, and also that adequate brakes are attached thereto; the main link attached to the swivel of the wire rope shall be made of the best quality of iron, and shall be tested by

weights satisfactory to the Inspector of Mines of the State; and bridle chains shall be attached to the main link from the cross pieces of the carriage; and no single link chain shall be used for lowering or raising persons into or out of said mine; and not more than five persons for each ton capacity of the hoisting machinery used at any coal mine shall be lowered or hoisted by the machine at any one time.

Sec. 4. The owner or agent of every coal mine or colliery, whether shaft, slope or drift, shall provide and maintain for every such mine an amount of ventilation not less than one hundred cubic feet, and such additional number of cubic feet as may be ordered by said Mine Inspector, per minute per person employed in such mine; and also an amount of ventilation of not less than five hundred cubic feet per minute for each mule or horse used in said mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute and render harmless and repel the poisonous and noxious gases from each and every working place in the mine; and break-throughs or air-ways shall be driven as often as the Inspector of Mines may order, at the different mines inspected by him; and all break-throughs or air-ways, except those last made near the working faces of the mines, shall be closed up and made air-tight by brattice, trap-doors or otherwise, so that the current of air in circulation in the mine may sweep to the interior of the mine, where the persons employed in such mine are at work; and all mines governed by this statute shall be provided with artificial means of producing ventilation, when necessary to provide a sufficient quantity of air, such as fanning, or suction fans, exhaust steam furnaces, or other contrivances of such capacity and power as to produce and maintain an abundant supply of air; but in case a furnace shall be used for ventilating purposes, it shall be built in such a manner as to prevent the communication of fire to any part of the works, by lining the upcast with an incombustible material for a sufficient distance up from the said furnace. All mines generating fire-damp shall be kept free from standing gas, and every working place shall be carefully examined every morning with a safety lamp, by a competent person or persons, before any of the workmen are allowed to enter the mine; and the person making such examination shall mark on the face of the workings the day of the month; and in all mines, whether they generate fire-damp or not, the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will shut up of their own accord and can not stand open; and the owner or agent shall employ a practical and competent inside overseer, to be called a "mining boss," who shall keep a careful watch over the ventilating apparatus, and the air-ways traveling-ways, pumps, timbers and drainage; also, shall see that, as the miners advance their excavations, that all loose coal, slate and rock overhead are carefully secured against falling in or upon the traveling-ways, and that sufficient timber, of suitable

lengths and sizes, is furnished for the places where they are to be used, and placed in the working places of the mines; and he shall measure the ventilation at least once a week, at the inlet and outlet, and also at or near the face of all the entries; and the measurement of air so made shall be noted on blanks furnished by the Mine Inspector; and on the first day of each month the "mining boss" of each mine shall sign one of such blanks, properly filled, and forward the same by mail to said Mine Inspector, a copy of which shall be filed at the office of the coal company, subject to inspection by miners.

Sec. 5. No person shall be knowingly employed as an engineer or mining boss, to take charge of any machinery or appliance whereby men are lowered into or hoisted out of any mine, but an experience, competent and sober person, and no person shall ride upon a loaded wagon or cage used for hoisting purposes in any shaft or slope. No young person under twelve years of age, or woman or girl of any age, shall be permitted to enter any coal mine to work therein, nor any person under the age of sixteen years, unless he can read and write.

Sec. 6. All safety lamps used for examining or working coal mines shall be property of the owner of the mine, and shall be under the charge of the agent thereof. The term "owner" in this act shall mean the immediate proprietor, lessee or occupier of any coal mine or colliery, or any part thereof; and the term "agent" shall mean any person having, on behalf of the owner as aforesaid, the care and management of any coal mine or colliery, or any part thereof.

Sec. 7. All boilers used in generating steam in and about coal mines and collieries shall be kept in good order, and the owner or agent, as aforesaid, shall have said boilers examined and inspected by a competent boiler maker, or other well qualified person, as often as once every six months, and the result of such examination shall be certified, in writing, to the Mining Inspector; and every steam boiler shall be provided with a proper steam gauge, water gauge and safety valve; and all underground, self-acting or engine planes, or gangways, on which coal cars are drawn and persons travel, shall be provided with some proper means of signaling between the stopping places and the ends of said planes or gang-ways; and sufficient places of refuge, at the sides of said planes or gangways, shall be provided, at intervals of not more than fifty feet apart; and there shall be cut, in the side of every hoisting shaft, at the bottom thereof, a traveling-way, sufficiently high and wide to enable persons to pass the shaft, in going from one side of the mine to the other, without passing over or under the cage or hoisting apparatus.

Sec. 8. Whenever loss of life, or serious personal injury, shall occur by reason of any explosion, or of any accident whatsoever, in or about any coal mine or colliery, it shall be the duty of the owner of agent thereof to give notice to the Mine Inspec

tor, and if any person is killed thereby, to the coroner of the county, also; and the Inspector shall immediately go to the scene of said accident and render such assistance as he may deem necessary for the safety of the men, and shall ascertain, by the testimony before the coroner, or by taking other evidence, the cause of such explosion or accident, and file record thereof in his office.

Sec. 9. In all coal mines in the State the miners employed and working therein, the owners of the land, or other persons interested in the rental or royalty of any such mine, shall at all proper times have full right of access to, and examination of, all scales, machinery, or apparatus used in or about such mine, to determine the quantity of the coal mined, for the purpose of testing the accuracy of all such scales, machinery or apparatus; and such land owners, or other persons, may designate or appoint a competent person to act for them, who shall, at all proper times, have full right of access to, and examination of, such scales, machinery or apparatus, and seeing all weights and measures of coal mined, and the accounts kept of the same; but not more than one person, on behalf of the land owners, or other person interested in the rental or royalty, jointly, shall have such right of access, examination and inspection of scales, weights, measures and accounts at the same time, and that such person shall make no unnecessary interference with the use of such scales, machinery or apparatus; and the miners employed in any mine may, from time to time, appoint two of their number to act as a committee to inspect, not oftener than once in every month, the mine and the machinery connected therewith, and to measure the ventilating current, and if the owner, agent, or manager so desires, he may accompany such miners, by himself, or two or more persons whom he may appoint for that purpose. The owner, agent, or manager shall afford every necessary facility for making such inspection and measurement; but the said miners shall not in any way interrupt or impede the work going on in the mine at the time of such inspection and measurement.

Sec. 10. Any miner, workman, or other person, who shall intentionally injure any shaft, lamp, instrument, air-course or brattice, or obstruct or throw open air-ways, or open a door and not close it again, or carry lighted pipes or matches into places that are worked by safety lamps, or handle or disturb any part of the machinery, or enter any place of the mine against caution; or who willfully neglects or refuses to securely prop the roof of any working place under his control, or disobey any order given in carrying out the provisions of this act, or do any other act whereby the lives or the health of persons, or the security of the mines or machinery is endangered, shall be deemed guilty of a misdemeanor, and upon conviction, may be punished by a fine of not less than twenty-five dollars nor more than two hundred dollars, or may be imprisoned in the county

jail not less than thirty days, nor more than one year, or may be punished by both such fine and imprisonment, at the discretion of the court.

Sec. 11. In case any owner or agent disregards the requirements of this act, any court of competent jurisdiction may, on application of the Inspector, by civil action in the name of the State, enjoin or restrain the owner or agent from working or operating such mine with more than twelve miners underground during each twenty-four hours, until it is made to conform with the provisions of this act. And such remedy shall be cumulative, and shall not take the place of or affect any other proceedings against such owner or agent, authorized by law for the matter complained of in such actions.

Sec. 12. For any injury to person or property occasioned by any violation of this act, or any willful failure to comply with its provisions, by any owner or lessee or operator of any coal mine or opening, a right of action against the party at fault shall accrue to the party injured for the direct damages sustained thereby, and in any case of loss of life by reason of such violation or failure, a right of action against the owners and operators of such coal mine or colliery, shall accrue to the widow and lineal heirs of the person whose life shall be lost, for like recovery of damages for the injury they shall have sustained.

Sec. 13. The provisions of this act shall not apply to or affect any coal mine in which not more than ten men are employed underground during each twenty-four hours, but on the application of the proprietor, or of the miners in any such mine, or when the Mine Inspector may deem it necessary, said Mine Inspector shall make, or cause to be made, an inspection of such mine, and shall direct and enforce any regulations in accordance with the provisions of this act, that he deems necessary for the safety and health of the miners.

Sec. 14. That the board of examiners, heretofore appointed under the provisions of this act concerning coal mines, approved February 24, 1883, and amended by this act, shall hold their office for and during the time for which they were appointed, to-wit: until January 1, A. D .1887. And it shall be the duty of the board of examiners to meet at such time, and at such places within this State, as may be directed by the Governor of this State, and examine such persons as may present themselves for examination, touching their qualifications for the office of Mine Inspector, as provided in this act, and shall inquire into their character and qualifications, and shall certify the names of such persons as they shall find to be competent to fill such office of Mine Inspector, to the Governor, which list of names, so certified, shall be placed on file in the office of the Secretary of State. Members of such board of examiners shall, before entering upon their duties, take and subscribe the following oath, viz.: We, the undersigned, do solemnly swear (or

affirm) that we will perform the duties of examiners of applicants for appointment of Inspector of Coal Mines, to the best of our abilities, and that in recommending or rejecting said applicants, we will be governed by the evidence of qualifications to fill the position under the law creating the same, and not by any consideration of political or personal favors; that we will certify to all whom we may find qualified, according to the true intent and meaning of the act, and none others, to the best of our judgment. The qualifications of candidates for said office of Inspector of Mines, to be inquired into and certified by said examiners, shall be as follows, namely: They shall be citizens of the United States, of temperate habits, of good repute as men of personal integrity, shall have obtained the age of thirty years, and shall have had at least one year's experience in the working of coal mines of Colorado, and five years of practical experience in the working of coal mines in the United States, and have a practical knowledge of mining engineering, and of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, particularly fire-damp. The board of examiners shall receive six dollars per day, and same mileage as is allowed to members of the Legislature, to be paid out of the State treasury, upon the filing of the certificates of the examining board in the office of the Secretary of State, as hereinbefore provided. As often as vacancies in said office of Inspector of Mines shall occur, by death, resignation, or malfeasance in office, which shall be determined in the same manner as in the case of any other officer of the State government, the Governor shall fill the same, by appointment, for the unexpired term, from the names on file in the office of the Secretary of State, as hereinbefore mentioned, as having passed examination. On January 1, A. D. 1887, and every four years thereafter, the Governor shall appoint one reputable mining engineer, of known ability, and shall notify the judges of four of the judicial districts of the State, within which coal mines are being operated, to each appoint one reputable coal miner, of known experience and practice, from their respective districts, and the five so appointed shall constitute a new board of examiners, whose duties, term of service and compensation shall be the same as those provided for by this section; and from the names that may be certified by them, the Governor shall appoint the Inspector of Mines provided for in this act. Nothing in this act shall be construed to prevent the re-appointment of any Inspector of Coal Mines. The Inspector of Coal Mines shall receive for his services an annual salary of two thousand dollars, and ten cents per mile mileage for all distances traveled in the discharge of his official duties, to be paid monthly by the State Treasurer; and said Inspector shall reside in the State, and shall keep an office at the Capitol, or other building, in which the offices of the State are located. Each Inspector is hereby authorized to procure such instru

ments, and chemical tests, and stationery, from time to time, as may be necessary to the proper discharge of his duties under this act, at the expense of the State, which shall be paid by the State Treasurer, upon accounts duly certified by him and audited by the proper department of the State. All instruments, plans, books, memoranda, notes, etc., pertaining to the office, shall be the property of the State, and shall be delivered to their successors in office.

Sec. 15. The Inspector of Coal Mines shall, before entering upon the discharge of his duties, give bond in the sum of five thousand dollars, with sureties, to be approved by the judge of the District Court in which he resides, conditioned for the faithful discharge of his duty, and take an oath (or affirmation) to discharge his duties impartially and with fidelity, to the best of his knowledge and ability.

Sec. 16. No person acting as manager or agent of any coal mine, or as a mining engineer for any coal mining company, or to be interested in operating any coal mine, shall at the same time act as an Inspector of Coal Mines under this act.

Sec. 17. The Inspector of Coal Mines, and his deputy, shall devote the whole of their time to the duties of their office. It shall be the duty of the Inspector, or his deputy, to enter into and thoroughly examine all coal mines in the State in which more than ten men are employed, at least once each quarter, to see that all the provisions of this act are observed and strictly carried out, and the Inspector, or his deputy, or both, may enter, inspect and examine any coal mine in the State, and the works and machinery belonging thereto, at all reasonable times, by night or day, but so as to not unnecessarily obstruct or impede the workings of the mine; and the owner, or any agent of such mine, is hereby required to furnish the means necessary for such entry and inspection. The Inspector shall make, to the Governor of the State, a biennial report, which shall show the number of coal mines and development of the same during each year, and of persons employed in and about each mine, and the extent to which the law is obeyed; the progress made in the improvement sought to be secured by the passage of this act; the number of accidents and deaths resulting from injuries received in coal mines; as, also, statistics showing output of coal and development made annually at each mine, with all facts concerning the production and transportation of coal to market, and other facts of public interest coming under the provisions of this act; which record shall be filed in the Inspector's office. The Secretary of State is hereby authorized to have printed two thousand copies of said biennial report, at the expense of the State, for distribution to members of the Legislature, mine owners, superintendents, and others interested in coal mines; said report shall be printed on, or before, December 31, preceding the biennial session of the Legislature, and the Inspector

is hereby authorized to employ a Deputy Inspector, and such clerical assistance as may be required in his office, whose salaries shall not exceed two thousand (2,000) dollars in any one year, which shall be paid out of any moneys appropriated for that purpose on certificate of said State Inspector of Coal Mines, showing the services rendered and the amount thereof; and, on presentation of such certificate to the State Auditor by the person entitled thereto, he shall issue his warrant on the State Treasurer for the amount thereof, to be paid out of any appropriation as aforesaid; and the said Inspector shall be allowed the further sum of ten cents per mile mileage for all distances actually traveled by him, or his deputy, in the active discharge of their official duties, but the total sum of such mileage allowed for the mileage expenses of both such Inspector and his deputy shall not exceed the sum of two thousand five hundred dollars in any one year. It is further hereby enacted that any balance of the above appropriation which may remain after paying the salary of the Deputy Inspector and his mileage, as hereinbefore provided, shall be applied to the hire of clerical assistance for the Inspector and for necessary office expenses.

Sec. 18. That the owner, agent or lessee of each coal mine or colliery in this State employing ten or more men shall, when working in close proximity to an abandoned mine or part of a mine containing water or fire-damp, cause bore-holes to be kept at least twenty feet in advance of the coal face and sides of all working places in such mine or colliery known to be approaching old and abandoned workings. Side holes not to be more than twenty-five feet apart and to a like depth, also that it shall not be lawful for any owner or agent operating vertical coal veins, to mine or extract coal from levels under any portion of said mine or adjoining mines where water exists, without first having pumped out such water. All veins pitching over seventy degrees shall be understood as vertical veins under this act. And said owner or agent shall cause all abandoned shafts, air-shafts, slopes, slack piles, or cave holes to be securely and safely fenced off; and in all bituminous and lignite coal mines coming under the provisions of this act, the State Inspector of Coal Mines shall have the authority to compel the owners, agents or lessee of coal mines to remove any or all fine coal or slack which may accumulate in the working places or holes, and where gob-fires or spontaneous combustion are known or even suspected to exist, a careful inspection shall be made daily of the workings by the mine boss or another competent person, and if an increase in temperature be localized in any part of the gobs or other places, prompt action shall be taken to remove the heated gob or debris, or extinguish the fire by water or other contrivance; but if the fire has already reached such proportions that it is impossible to extinguish it in that way, then it shall be the duty of the superintendent, or mine boss in the absence of the superintendent, to at once build suitable stoppings of

double walls of a concave shape, and at least two feet apart, with ends, top and bottom, built into cuttings made into the coal or rock, and the center between the walls to be filled in with sand or other fine earthy matter, which shall be closely tamped, so as to fill up all cracks and crevices, the outside of said walls to be carefully plastered with lime and cement, so as to completely isolate the fire from air. Should combustion still be suspected to be going on, then steam, where practicable, shall be injected towards the fire from pipes in connection with boilers, and passing through said walls or stoppings, or to flood with water the site of the fire; and that in all coal mines known to generate explosive gas, that the owner or agent shall provide and adopt a system by which water under pressure or otherwise shall be sprinkled and make damp all accumulations of fine coal dust from time to time that may accumulate on any haulage road, rooms, stopes or any other working place. Also, that no owner or agent shall use any part of the underground workings of such coal mines as a magazine for the storage of gunpowder or any other kind of blasting agent; on all underground roads where coal is hauled by machinery, and where the grade will average more than six (6) feet to the hundred (100), and which are used for traveling ways for men, double draw-bars shall be attached to the bottom or other parts of every car, so that two separate couplings may be used to connect each and every car lowered or hoisted on any road coming under this act, and that the hooks which connect with the draw-bar of the car shall be so constructed, with a clevis or other contrivance, so as to prevent them from becoming detached while the cars are in motion on the slope; also, that double chains, with approved safety hooks, shall be attached to the socket of the hoisting ropes; Provided, That any appliance other than those herein required may be used in the construction and hoisting of cars which may accomplish the same result with equal safety and security to life and limb.

Sec. 19. The mining boss, or other competent person, shall make daily inspection of ropes, chains, cages and other hoisting appliances, guides and shaft timbers, and make a record of such daily inspection in a book, kept at the office in the mine, for that purpose, and the fire boss shall keep a daily record of any defects in the ventilating appliances, and any standing gas that may be found in said mine, designating the entry and room in which said gas is found. Each of the records herein required to be kept, shall be open at all times to the Mine Inspector's and miners' committee's inspection, and a copy thereof shall be filed in the office of the said Mine Inspector on the first Monday of December of each year.

Sec. 20. 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 duties, or violating such provisions, shall, upon conviction, be punished by a fine of not less than one hundred dollars, nor exceeding five hundred dollars, at the discretion of the court, and all penalties recovered under this act shall be paid into the treasury of the State.

Sec. 21. All acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

Sec. 22. An emergency exists; therefore, this act shall take effect and be in force from and after its passage.

Approved April 8, 1885; amended April 2, 1887.

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