Colorado. Coal
Mine Inspector.

Biennial Report.

1909-1910

Fourteenth Biennial Report

OF THE

State Coal Mine Inspector

1909-1910

DENVER, COLORADO
THE SMITH-BROOKS PRINTING CO., STATE PRINTERS
1910

LETTER OF TRANSMITTAL.

HON. JOHN F. SHAFROTH,
Governor of Colorado.

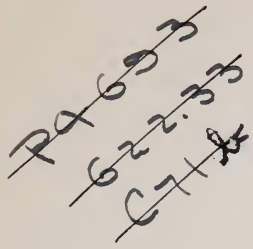
Sir—In accordance with section seventeen of the statute entitled "Coal Mines," I have the honor of submitting to you the fourteenth biennial report of this department.

I wish to express to you my sincere appreciation of the deep interest and concern you have manifested in the work and welfare of this department, especially your desire to protect by better laws the life and limb of the coal miners.

Very truly yours,

JAMES DALRYMPLE,
State Inspector of Coal Mines.

January 3, 1911.



PERSONNEL OF THE STATE COAL MINING DEPARTMENT.

JAMES DALRYMPLE.....Chief Inspector of Mines
Newcastle, Garfield County, Colorado.
Successor to
JOHN D. JONES.....Chief Inspector of Mines
Rockvale, Fremont County, Colorado.
(Resigned Nov. 19th, 1910.)

FRANK N. OBERDING.....Deputy State Coal Mine Inspector
Louisville, Boulder County, Colorado.

HARRY DOUTHWAITE.....Deputy State Coal Mine Inspector
Colorado Springs, El Paso County, Colorado.

HENRY KING.....Deputy State Coal Mine Inspector
Canon City, Fremont County, Colorado.

ADA R. TIBBITS.....Clerk

The Fourteenth Biennial Report

OF THE

State Inspector of Coal Mines

1909-1910

INTRODUCTION.

The coal industry of Colorado during the past two years shows a steady growth. The output in 1909 was 10,772,490 tons, and in 1910 it reached 12,104,887 tons, making an increase of 2,331,880 tons as compared with that of the preceding biennial period.

During the two years twenty-six new mines were opened up and developed, and extensive improvements were made in many of the older mines. Several old mines were re-established, and eleven were suspended or shut down permanently.

In 1909 the usual car shortage prevailed in the fall and early winter; other than this there were no adverse conditions to handicap the normal operating of the mines. However, in 1910, the coal operators in many of the producing districts were confronted by serious obstacles, and that there was, despite these drawbacks, an increase of 1,332,397 tons over the production of 1909, is an indication that Colorado will remain the largest coal producer west of the Mississippi river. The lignite coal output shows a material decrease in 1910, amounting to 518,922 tons, as compared with that of 1909. Boulder and Weld counties are the heaviest producers of the lignite variety, but a strike was declared on April 1, 1910, which is still pending, with no immediate prospect of settlement. The total decrease in these two counties was 573,313 tons. Boulder losing 544,451 and Weld 28,962 tons, but 55,021 tons were gained in Jefferson and El Paso counties. Douglas and Montezuma counties not producing any coal in the last year, 630 tons were further lost. While many of the strike-effected mines have been working with non-union men, none worked full capacity.

In Fremont, Huerfano and Las Animas counties a car shortage, due chiefly to lack of trackage and rolling stock, handicapped the production in September and October, forcing many mines to work only half time, although there was a market waiting for all their product.

In Las Animas county several hundred thousand tons were lost on account of the explosions in three of the largest producing mines of the State, viz.: Primero, Starkville and the Delagua. The commercial loss to these three properties was very great, as well as the loss of life. The Leyden disaster will result in the entire loss of tonnage to Jefferson county for some time to come, as the mine was totally wrecked, and will require a new shaft to be sunk and the installation of new equipments. A fire in the Fremont mine put that mine out of commission for two weeks, pending repairs.

Routt county, which two years ago produced only 5,000 tons, in 1910 had a tonnage of 254,162. The Moffat railroad having reached Steamboat Springs made it profitable to develop some of the great coal beds of that district, and a number of mines were opened up and developed on a large scale, and no doubt the next year will see the output doubled in that district. A local strike is also pending there. The product of this county is of a good bituminous quality, and much of it was shipped into Denver.

Another very serious condition was the shortage of miners in all the coal camps, especially in the southern field, where few of the mines were able to work to their full capacity, because of the lack of men. The mine disasters drove hundreds of men from the camps. Furthermore, the men employed in the mines of this district are mostly natives of Italy, Austria, Japan and Korea, and are not practical miners, very few of them ever having been in a coal mine before taking employment in the Colorado mines. Outside of Boulder and Weld counties, all the mines are operated with non-union men, and since the strike has been on, the mines of these two counties are worked with men not affiliated with a union.

In 1909 eighty-nine men were killed and one mine disaster occurred, the gas explosion at the Toller mine, where nine men lost their lives. In 1910 the death rate was the highest had in the history of Colorado coal mining. Seventy-five men in the Primero, fifty-six in the Starkville, seventy-nine in the Delagua explosions, and ten in the Leyden fire, a total of 220. Ninety-nine men were killed by falls of rock and coal, or run over by motor trips, etc.

The price of coal went up; the bituminous and semi-bituminous was raised from $6.00 to $6.25 per ton, and the lignite from $5.00 to $5.25 per ton, and there was a market for every ton mined. There was no increase in the scale of wages, and that is the main contention of the strike. The union men demand an increase of .5 55 for day work and dead work; 3 cents per ton, machine mined coal, and 4 cents per ton, picked mined coal.

The mine catastrophes in 1910 called attention to the inadequacy of the coal mining law which was enacted in 1883 and amended in 1887, when coal mining in Colorado was still in its infancy. The four mine disasters resulting in such a terrific loss

of life aroused a great deal of public sentiment, and a general demand for a better mining law prompted Governor Shafroth to appoint a mining commission to revise the old law or draft a new one. Dr. Victor C. Alderson, President of the School of Mines at Golden; Dr. John B. Elkely, Professor of Chemistry at the State University, Boulder; Professor R. D. George, State Geologist, and Mr. James Dalrymple, State Inspector of Coal Mines, who succeeded Mr. J. D. Jones, who resigned last August, compose this commission. This board made a thorough investigation of the causes leading to such explosions as occurred in the past year, examined mines in all sections of the State, and considered numerous recommendations made for improvements. The commission drafted a new law, which, if enacted by the Eighteenth General Assembly, will cope with all the requirements of coal mining and reduce the number of the fatalities.

A very commendable feature of the past year was the installation by several of the coal companies of a rescue car equipped with safety helmets for use in conducting rescue work in case of explosions and fire. A number of mines have also been supplied with these safety helmets, and men are being trained in the use of them. The coal operators manifested a great desire to place their mines on a safe and sanitary basis, realizing that this will give better results in every way than a careless method of working the mines at the risk of life and limb.

The increased production of the past two years indicates that the coal industry of this State is in a flourishing condition commercially, and that in a few years the production will reach the twenty million ton mark. Furthermore, the promptness and readiness with which the coal operators in most instances complied with the recommendations for improvements made by this department, shows that a new stringent mining law will have no depressing effect on their activity.

SUMMARY OF THE COAL PRODUCTION OF COLORADO IN 1909 AND 1910.

	1909	1910
Number of mines in operation	167	155
Number of new mines opened up	15	12
Tons of lignite coal produced	2,173,877	1,654,955
Tons of semi-bituminous coal produced	855,762	1,014,588
Tons of bituminous coal produced	7,613,332	9,284,758
Tons of anthracite coal produced	59,519	80,586
Tons of unclassified coal produced, estimated	70,000	70,000
Total number of tons of coal produced	10,772,490	12,104,887
Increase in number of tons as compared with 1909		1,332,397
Tons of coal mined by hand	9,033,057	10,563,651
Tons of coal mined by machinery	1,739,433	1,541,236

SUMMARY OF THE COAL PRODUCTION OF COLORADO IN 1909 AND 1910—Concluded.

	1909	1910
Total number of mining machines used	208	222
Total number tons of coke produced	1,076,593	1,190,901
Total number of coke ovens	3,240	3,164
Number of employes in and about the mines	13,156	14,768
Number of employes at the coke ovens	1,089	1,090
Number of non-fatal accidents	116	146
Number of fatal accidents in the mines	89	319
Tons of coal mined for each life lost	121,039.1	37,946.3
Tons of coal mined for each non-fatal accident	92,886.3	82,910.4
Number of employes for each life lost	147.8	46.2
Number of killed per thousand employed	6.76	21.6
Number of employes for each non-fatal accident	113.4	101.2

TABLE

SHOWING CAUSE AND NUMBER OF FATAL AND NON-FATAL ACCIDENTS IN THE COAL MINES OF COLORADO IN 1909 AND 1910; THE NUMBER OF WIVES MADE WIDOWS AND THE NUMBER OF CHILDREN LEFT FATHERLESS.

	1909.	1910.
1. Total number of accidents	79	96
2. Total number of men killed	89	319
3. Total number of men injured	116	146
Serious injuries	79	115
Minor injuries	37	31
4. Total number of wives made widows	50	163
5. Number of children left fatherless	71	303

6. Causes:

	Killed.		Injured.	
(a) Gas explosions	10	...	13	9
(b) Dust explosions (including mixtures of dust and gas)	3	210	...	...
(c) Falls of roof, coal, rock and drawslate	63	73	70	79
(d) Powder explosions	...	...	2	2
(e) Crushed by trip cars	7	18	25	28
(f) Shaft accidents	2	1	...	2
(g) Miscellaneous	2	3	6	26
(h) Electrocuted	1	...	...	...
(i) Suffocated	1	14	...	...
Total	89	319	116	146

TABLE

SHOWING THE NUMBER OF MEN WORKING IN AND ABOUT THE MINES OF EACH COUNTY.

Counties.	1909.	Counties.	1910.
Las Animas	5,153	Las Animas	5,522
Huerfano	2,654	Huerfano	3,469
Boulder	1,404	Fremont	1,416
Fremont	1,305	Boulder	1,356
Gunnison	731	Gunnison	715
El Paso	348	El Paso	385
Weld	289	Weld	349
Garfield	258	Routt	303
Pitkin	240	Jefferson	290
Jefferson	213	Pitkin	257
La Plata	188	La Plata	221
Delta	138	Garfield	219
Mesa	117	Mesa	175
Routt	116	Delta	87
Douglas	2	Jackson	4
	13,156		14,768

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Simpson	Mitchell	Acme	Rex No. 1	Rex No. 2
Thickness of bed	8 ft.	5 ft.	6 ft.	6 ft.	6 ft.
Kind of opening	Shaft	Shaft	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite	Lignite	Lignite
January	5,876	1,300	11,162	10,804	3,196
February	6,993	180	11,520	10,364	2,917
March	7,460	none	9,430	9,678	3,330
April	8,649	none	3,023	6,580	2,854
May	7,584	1,007	4,514	4,382	1,961
June	8,524	1,089	3,663	3,694	1,931
July	6,936	842	2,753	3,028	1,651
August	5,379	831	4,315	4,811	1,539
September	6,584	2,401	10,943	10,225	3,724
October	13,978	7,535	16,502	14,889	2,648
November	20,678	11,389	21,018	20,205	4,024
December	23,935	11,913	23,463	20,867	3,763
Totals	122,576	38,487	122,306	119,527	33,538

BOULDER COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Hecla	Gorham	Industrial	Vulcan	Monarch	Standard
5 ft.	6 ft.	6 ft.	7 ft.	4 to 6½ ft.	6 to 9 ft.
Shaft	Slope	Shaft	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
7,442	7,907	9,339	960	15,309	16,213
7,063	9,816	10,725	486	14,824	17,631
6,045	9,289	7,858	137	15,180	18,660
4,384	8,338	7,609	497	11,713	14,268
2,108	6,236	3,878	328	8,912	15,079
2,202	4,715	3,352	487	6,691	11,277
1,960	3,826	2,492	462	4,765	11,045
2,595	995	6,075	750	7,586	10,937
6,411	8,490	10,085	1,083	13,152	17,053
8,108	10,582	12,272	5,095	11,834	17,813
10,595	11,337	14,056	6,118	11,738	20,484
11,387	11,028	15,444	6,336	11,229	20,208
70,300	92,559	103,185	22,739	132,933	190,668

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine.....Strathmore	Fox	Matchless	Centennial	Summit
Thickness of bed.....6 to 10 ft.	8 ft.	4½ to 5 ft.	6 ft.	5 to 6 ft.
Kind of opening..... Shaft	Shaft	Shaft	Shaft	Shaft
Character of coal..... Lignite	Lignite	Lignite	Lignite	Lignite
January 2,236	2,814	1,915	8,240	1,102
February 1,691	2,350	2,226	7,333	1,506
March 2,292	2,113	1,531	8,400	3,197
April 2,171	1,931	736	4,417	4,927
May 1,758	1,457	747	4,865	2,500
June 1,753	1,441	1,027	2,290	1,336
July 1,980	1,331	1,145	2,130	1,983
August 1,783	2,420	178	2,608	2,004
September 1,360	4,118	186	2,800	3,200
October 1,963	5,985	737	2,910	3,758
November 2,240	6,490	663	3,180	3,659
December 2,655	7,913	1,000	3,900	4,000
Totals 23,882	40,363	12,091	53,073	33,172

BOULDER COUNTY, 1909—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Nonpareil 9 to 10 ft. Shaft Lignite	Sunnyside 5 ft. Shaft Lignite	Capitol 6 ft. Shaft Lignite	Monarch No. 2 5 to 6 ft. Shaft Lignite	New Baker 8 ft. Slope Lignite	Total Tonnage
6,717	1,715	9,150	.....	239	123,636
4,782	1,755	9,189	.....	211	123,562
1,726	none	8,000	.....	216	114,542
2,536	none	7,700	.....	124	92,457
1,950	543	5,457	.....	91	75,357
2,480	347	3,911	.....	82	62,292
2,129	389	3,355	.....	26	54,228
1,987	388	4,642	.....	none	61,823
3,130	329	7,727	.....	23	113,024
4,061	255	11,013	.....	27	151,965
4,278	469	11,982	.....	10	184,613
4,300	300	11,102	4,397	100	199,240
40,076	6,490	93,228	4,397	1,149	1,356,739

PRODUCTION OF DELTA COUNTY, 1909.

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

Name of mine	King	Black Diamond	Paonia	
Thickness of bed	9-14 ft.	16 ft.	9 ft.	
Kind of opening	Slope	Drift	.....	Total
Character of coal	Bituminous	Bituminous	Bituminous	Tonnage
January	4,443	...	.....	4,443
February	4,486	...	.....	4,486
March	3,422	...	.....	3,422
April	3,483	...	.....	3,483
May	2,283	...	.....	2,283
June	2,032	...	.....	2,032
July	2,405	...	.....	2,405
August	2,817	...	.....	2,817
September	3,815	...	.....	3,815
October	4,507	...	.....	4,507
November	5,703	...	.....	5,703
December	6,000	850	4,000	10,850
Totals	45,396	850	4,000	50,246

PRODUCTION OF DOUGLAS COUNTY, 1909.

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

Name of mine	Platte Canon
Thickness of bed	5½ to 7 ft.
Kind of opening	Shaft
Character of coal	Lignite
Total tonnage	130
Total	130

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Curtis	Rapson No. 2	Pikeview	Danville
Thickness of bed	12 to 17 ft.	7 to 9 ft.	9½ to 13 ft.	6 to 18 ft.
Kind of opening	Shaft	Shaft	Shaft	Slope
Character of coal	Lignite	Lignite	Lignite	Lignite
January	6,961	5,188	11,309	3,234
February	7,682	4,081	8,500	3,028
March	8,630	3,472	10,100	3,950
April	7,679	2,956	7,769	6,150
May	5,944	2,223	8,667	3,463
June	4,194	2,075	7,688	3,244
July	4,046	2,224	8,367	3,063
August	4,170	2,144	8,341	2,542
September	4,370	3,050	8,779	2,551
October	5,944	3,886	8,891	4,064
November	8,559	5,740	8,339	3,375
December	9,000	7,500	9,000	4,000
Totals	77,179	44,539	105,750	42,664

EL PASO COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Patterson	Austin Bluffs	Neer	Franceville	Last Chance	
16 ft.	7 ft.	4½ ft.	6 ft.	4 ft.	
Slope	Shaft	.....	Slope	.....	Total
Lignite	Lignite	Lignite	Lignite	Lignite	Tonnage
3,200	2,520	358	200	.....	32,970
4,000	1,604	318	115	.....	29,328
3,200	1,444	158	184	.....	31,138
1,900	1,420	100	124	.....	28,098
1,500	824	Idle	50	.....	22,671
1,086	440	Idle	40	.....	18,767
800	407	Idle	33	.....	18,940
1,137	Shut down	Idle	70	.....	18,404
1,998	for repairs	Idle	90	.....	20,838
2,267	1,765	250	92	.....	27,159
1,988	1,651	253	120	.....	30,025
3,858	2,346	350	135	255	36,444
26,934	14,421	1,787	1,253	255	314,782

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Rockvale	Coal Creek	Fremont	Brookside	Chandler
Thickness of bed	3½ ft.	3 ft.	4½ to 5 ft.	3½ ft.	4 to 5 ft.
Kind of opening	Shaft	Slope	Shaft	Slope	Shaft
Character of coal	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.
January	21,518	11,477	9,205	Idle	9,830
February	19,453	9,985	10,005	Idle	7,700
March	10,148	7,716	4,002	Idle	3,472
April	19,263	10,816	10,369	Idle	7,101
May	13,432	8,529	8,433	Idle	6,582
June	19,079	9,632	7,995	Idle	6,518
July	19,251	9,968	7,411	Idle	7,559
August	15,760	10,660	5,811	Idle	8,469
September	13,584	6,316	5,637	Idle	4,891
October	11,615	9,947	7,397	Idle	7,597
November	22,273	11,299	12,905	Idle	8,910
December	23,415	12,215	16,976	3,602	8,879
Totals	208,791	118,560	106,146	3,602	87,508

FREMONT COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Radiant 3½ ft. Slope Semi-bit.	Magnet 4½ ft. Slope Semi-bit.	Royal Gorge 3½ ft. Slope Semi-bit.	Emerald 3 ft. Slope Semi-bit.	Norton 3 to 4½ ft. Slope Semi-bit.	Williams-burg Slope 3½ ft. Slope Semi-bit.	Colorado Central 5½ ft. Shaft Semi-bit.
2,592	4,775	.....	1,500	839	400	Idle
562	4,149	.....	1,901	613	320	Idle
698	2,922	.....	451	70	100	997
Idle	2,792	.....	2,302	Idle	90	1,393
Idle	1,558	.....	1,196	Idle	Idle	1,284
Idle	2,904	.....	1,921	Idle	Idle	1,440
Idle	3,952	.....	1,646	Idle	150	1,321
Idle	3,127	.....	1,593	Idle	200	1,829
Idle	2,501	.....	1,595	Idle	200	1,541
Idle	3,115	.....	1,182	Idle	200	1,919
Idle	3,043	.....	1,400	Idle	200	1,328
Idle	2,716	6,000	1,500	Idle	200	1,263
3,852	37,554	6,000	18,187	1,522	2,060	14,315

PRODUCTION OF FREMONT COUNTY, 1909—Concluded.

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

Name of mine	Diamond	Willie	
Thickness of bed	5½ to 6 ft.	3 ft. 3 in.	
Kind of opening	Shaft	Slope	Total
Character of coal	Semi-bit.	Semi-bit.	Tonnage
January	319	200	62,655
February	602	...	55,290
March	214	...	30,790
April	Not producing	...	54,126
May	Not producing	99	41,113
June	Not producing	178	49,667
July	Not producing	167	51,425
August	439	154	48,042
September	445	244	36,954
October	280	340	43,592
November	50	302	61,710
December	400	273	77,439
Totals	2,749	1,957	612,803

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Midland	Coryell
Thickness of bed	6 to 7 ft.	13 ft.
Kind of opening	Drift	Drift
Character of coal	Bituminous	Bituminous
January	5,354	9,578
February	5,011	9,231
March	6,049	11,278
April	6,588	8,274
May	5,181	4,937
June	5,813	7,522
July	5,450	8,714
August	3,932	6,514
September	3,122	6,783
October	4,546	6,736
November	2,488	7,097
December	3,600	6,288
Totals	57,134	92,952

GARFIELD COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Keystone 2 ft. Slope Bituminous	South Canon 15 ft. Drift Bituminous	Diamond 4, 16 & 12 ft. Tunnel Bituminous	Total Tonnage
827	3,398	175	19,332
707	4,049	none	18,998
323	4,365	none	22,015
326	3,689	650	19,527
331	3,462	1,000	14,911
225	3,097	1,800	18,457
105	3,429	4,000	21,698
71	2,547	1,800	14,864
87	1,945	1,000	12,937
207	3,675	3,000	18,164
264	4,161	2,075	16,085
272	4,046	3,000	17,206
3,745	41,863	18,500	214,194

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Crested Butte	Floresta	Somerset
Thickness of bed	8 to 14 ft.	3½ ft.	21 ft.
Kind of opening	Drift	Slope	Slope
Character of coal	Bituminous	Anthracite	Bituminous
January	8,214	Idle	18,959
February	1,623	Idle	17,868
March	11,938	Idle	18,538
April	8,915	Idle	21,702
May	10,620	Idle	21,205
June	14,906	7,617	23,526
July	16,538	8,579	22,542
August	15,512	12,138	21,229
September	12,547	9,247	18,913
October	11,541	6,472	19,834
November	4,523	6,813	21,521
December	8,578	777	23,038
Totals	125,455	51,643	248,875

GUNNISON COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Alpine	Kubler	Porter	Horace	Bulkley	
5 to 7 ft.	.....	14 ft.	3 ft.	7 ft.	
Shaft	Drift	Slope	Slope, Shaft	Slope	Total
Semi-bit.	Semi-bit.	Bituminous	Anthracite	Bituminous	Tonnage
3,789	2,066	1,293	714	1,463	36,498
2,200	862	Idle	.....	94	22,647
1,942	758	2,897	.....	3,176	39,249
3,250	2,202	1,988	.....	3,546	41,603
5,662	2,748	2,510	.....	4,108	46,853
6,864	3,165	4,346	760	1,165	62,349
6,432	3,765	5,726	794	Idle	64,376
4,490	3,635	6,128	1,374	Idle	64,506
7,404	4,034	4,920	1,219	111	58,395
7,919	4,018	3,689	942	2,009	56,424
6,283	5,586	5,402	1,275	4,367	55,770
6,780	3,663	2,872	798	2,649	49,155
63,015	36,502	41,771	7,876	22,688	597,825

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Robinson	Rouse	Walsen	Cameron
Thickness of bed	5 to 7 ft.	6 to 7 ft.	3½ to 7 ft.	3½ ft.
Kind of opening	Slope	Slope	Slope	Slope
Character of coal	Bituminous	Bituminous	Bitmuinous	Bituminous
January	23,506	20,270	7,588	4,147
February	15,826	15,553	9,206	4,065
March	12,213	14,209	8,043	4,766
April	18,503	15,507	10,451	4,718
May	17,427	17,390	11,900	5,295
June	18,317	14,610	10,090	5,408
July	21,679	18,849	10,799	5,733
August	14,831	17,146	14,132	5,601
September	18,030	8,292	15,284	5,731
October	10,160	15,935	12,726	6,717
November	17,320	20,225	9,601	6,358
December	20,463	19,183	13,750	6,364
Totals	208,275	197,169	133,570	64,903

HUERFANO COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Hezron	Pictou	Maitland	Pryor	Champion	Midway
					3 Beds
4 to 6 ft.	9 ft.	6 ft.	5 to 7 ft.	4¼ ft.	6, 6 and 4½ ft.
Slope	Slope	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
6,425	11,057	7,329	7,910	643	14,137
6,308	9,604	4,473	7,026	Shut down	11,530
5,910	6,709	2,570	6,290	.....	10,521
7,631	11,193	5,671	4,648	.....	14,610
8,859	13,529	6,161	5,430	.....	15,769
6,482	13,880	8,312	6,280	.....	14,998
6,395	14,218	8,162	6,083	.....	17,276
7,323	13,863	6,817	6,056	.....	16,190
9,858	10,056	2,723	5,337	.....	18,102
5,721	9,020	4,880	5,504	.....	18,855
10,773	13,576	6,609	9,100	.....	19,845
9,674	13,949	5,797	8,168	.....	21,385
91,359	140,654	69,504	77,832	643	193,218

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Toltec	Rugby	Pinon	Sunnyside
Thickness of bed	3½ ft.	4 ft.	3 to 4 ft.	7 ft.
Kind of opening	Slope	Slope	Shaft	Slope
Character of coal	Bituminous	Bituminous	Bitmuinous	Bituminous
January	6,080	8,117	5,185	4,462
February	3,538	4,410	216	2,139
March	2,589	4,046	2,319	2,365
April	6,768	4,683	3,357	1,085
May	8,335	5,236	4,056	1,218
June	6,643	5,290	4,477	1,171
July	6,539	6,650	4,861	2,008
August	4,925	7,333	6,408	5,012
September	3,301	4,816	6,186	2,320
October	3,731	4,940	5,206	5,170
November	5,863	8,524	8,019	6,500
December	5,583	8,466	8,919	7,072
Totals	63,895	72,511	59,209	40,522

HUERFANO COUNTY, 1909—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Huerfano	Oakdale	Round Oak	Tioga	Gordon	Big Four
5½ ft.	7 to 8 ft.	3 ft.	5½ ft.	5 ft.	7 ft.
Shaft	Slope	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
6,900	7,190	5,095	3,641	3,568	4,849
2,840	5,803	2,574	2,962	3,770	3,856
2,103	7,471	1,522	2,216	2,122	4,493
4,420	12,780	2,307	791	1,644	2,224
5,420	13,873	2,262	901	1,651	2,722
5,469	11,142	2,178	2,424	2,004	2,515
6,169	14,324	2,429	5,330	2,487	6,373
6,588	16,297	3,396	4,819	2,225	7,987
4,907	10,621	4,633	3,724	1,512	5,268
6,171	13,694	4,600	3,749	2,859	4,728
8,373	15,430	5,780	5,829	3,321	7,322
8,887	14,641	5,274	6,000	2,970	7,913
68,247	143,266	42,050	42,386	30,133	60,250

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Sweet	Caddell
Thickness of bed	5 ft.	4½ ft.
Kind of opening	Slope	Slope
Character of coal	Bituminous	Bituminous
January	322	694
February	Shut down	188
March	.....	186
April	.....	178
May	.....	235
June	.....	260
July	.....	912
August	.....	859
September	.....	985
October	.....	727
November	.....	710
December	.....	900
Totals	322	6,834

HUERFANO COUNTY, 1909—Concluded.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Beacon	Ravenwood	Ideal	Bunker Hill	Black Canon	
.....	5 ft.	.....	5½ ft.	3 ft. 8 in.	
Slope	Slope	Drift	Drift	Slope	Total
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Tonnage
900	.....	.....	.....	.....	160,015
2,200	.....	.....	.....	.....	118,087
1,690	.....	.....	.....	.....	104,353
1,124	1,620	.....	.....	.....	135,913
1,600	1,830	.....	.....	.....	151,099
2,323	1,431	.....	.....	.....	145,704
1,600	1,490	.....	.....	.....	170,366
1,100	1,351	.....	.....	.....	170,259
1,400	2,181	1,000	.....	.....	146,267
1,300	2,621	None	.....	.....	149,014
1,200	2,732	1,207	.....	.....	194,217
2,100	3,709	4,163	9,970	6,830	222,130
18,537	18,965	6,370	9,970	6,830	1,867,424

PRODUCTION OF JACKSON COUNTY, 1909.

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

Name of mine	Coalmont
Thickness of bed	65 ft.
Kind of opening	Shaft
Character of coal	Bituminous
December	2,000
Total	2,000

PRODUCTION OF JEFFERSON COUNTY, 1909.

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

Name of mine	Leyden	
Thickness of bed	9 ft.	
Kind of opening	Shaft	Total
Character of coal	Lignite	Tonnage
January	13,558	13,558
February	12,329	12,329
March	13,684	13,684
April	12,550	12,550
May	11,127	11,127
June	10.646	10,646
July	18,085	18,085
August	18,982	18,982
September	18,310	18,310
October	18,932	18,932
November	21,531	21,531
December	23,663	23,663
Total	193,397	193,397

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Primero	Berwind	Starkville
Thickness of bed	7 ft.	6 ft.	7 ft.
Kind of opening	Drift	Drift	Drift
Character of coal	Bituminous	Bituminous	Bituminous
January	23,545	27,976	21,330
February	25,277	32,039	17,037
March	27,228	37,901	20,576
April	18,924	36,984	8,052
May	18,927	34,408	9,708
June	27,710	36,621	15,669
July	34,946	38,348	20,765
August	34,670	30,795	20,690
September	35,077	31,770	19,853
October	31,009	36,986	20,599
November	33,180	35,338	22,186
December	30,776	31,509	24,931
Totals	341,269	410,675	221,396

LAS ANIMAS COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Engle	Morley	Sopris	Tabasco	Frederick	Delagua
3½ to 4 ft.	8 ft.	3½ to 4 ft.	6 to 9 ft.	7 ft.	6 ft.
Drift	Drift, Slope	Drift	Slope	Drift	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
21,920	24,396	12,732	12,739	14,674	49,734
14,032	21,240	12,437	14,509	13,066	41,316
8,947	18,769	14,561	16,855	15,047	54,459
none	17,155	14,145	15,214	13,683	46,672
none	21,504	14,725	14,888	718	51,924
none	17,844	14,058	10,176	idle	54,291
none	16,126	13,762	6,533	10,972	56,785
none	18,084	13,547	5,087	19,188	56,002
none	26,005	13,461	3,903	20,990	58,511
none	23,140	12,974	4,246	23,309	62,214
none	32,007	13,348	4,142	29,714	58,091
none	56,897	12,162	3,647	31,081	56,530
44.899	273,167	161,912	111,939	192,442	646,529

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Hastings	Gray Creek	Bowen
Thickness of bed	5 to 8 ft.	4 to 5 ft.	7 to 8 ft.
Kind of opening	Slope	Drift	Drift
Character of coal	Bituminous	Bituminous	Bituminous
January	20,890	13,117	18,683
February	25,329	11,089	11,583
March	30,381	14,129	idle
April	31,659	17,862	idle
May	26,654	17,378	idle
June	30,780	18,814	idle
July	32,405	18,214	idle
August	32,839	17,398	12,634
September	31,006	19,021	19,907
October	27,892	20,097	21,008
November	28,013	21,702	22,888
December	28,684	19,559	20,311
Totals	346,532	208,380	127,014

LAS ANIMAS COUNTY, 1909—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Cokedale	Piedmont	La Belle	Francisco	Green Canon	Suffield
6 ft.	4½ ft.	4 ft.	5 ft.	3½ & 1½ ft.	5 to 6 ft.
Drift, Slope	Slope	Drift	Slope	2 Slopes	Drift
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
32,374	9,900	4,412	2,292	6,772	10,540
30,965	11,973	4,152	2,174	4,241	5,144
35,794	16,687	4,777	2,582	5,485	2,468
33,842	14,243	4,378	2,520	5,465	566
33,395	14,680	4,191	2,120	6,159	none
28,842	12,521	2,716	.....	6,950	none
25,560	13,771	2,811	.....	5,375	2,765
23,483	14,660	2,449	.....	6,361	7,611
27,734	7,396	2,696	5,307	7,603	6,403
34,729	10,072	2,889	5,056	7,694	6,369
35,395	13,671	2,529	6,295	8,164	8,092
34,083	21,716	1,988	.....	8,221	8,391
376,196	161,290	39,988	28,346	78,490	58,349

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Forbes	Greenville	Black Diamond
Thickness of bed	6 ft.	5-8 ft.	3-4 ft.
Kind of opening	Drift	Slope	Slope
Character of coal	Bituminous	Bituminous	Bituminous
January	19,461	8,623	2,995
February	16,532	7,172	2,983
March	18,082	11,326	1,176
April	11,882	8,779	Idle
May	13,438	2,440	Idle
June	13,292	5,196	Idle
July	17,036	8,062	Idle
August	18,491	5,527	828
September	17,650	8,203	411
October	15,651	10,240	2,548
November	17,187	14,066	3,208
December	16,000	11,023	3,719
Totals	194,702	100,657	17,868

LAS ANIMAS COUNTY, 1909—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Toller	Broadhead	Majestic	Primrose	Ludlow	Kenneth
6-7 ft.	4 ft.	5 to 9 ft.	4 ft.	4 and 6 ft.	4½ ft.
Shaft	Slope	Drift	Slope	Drift	Drift
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
2,176	4,250	8,335	5,560	9,400	1,750
1,961	4,300	7,918	2,001	7,828	3,880
3,187	4,750	9,061	4,305	7,130	4,774
4,294	3,275	7,666	2,145	6,835	5,042
5,511	3,823	8,935	4,778	2,178	4,110
2,519	3,550	9,134	3,755	2,084	1,722
1,183	3,350	7,683	4,331	4,828	4,880
2,767	3,300	7,950	6,974	6,952	4,999
2,946	4,000	6,163	5,422	6,912	5,646
5,070	3,200	6,590	8,439	6,449	6,603
6,879	4,600	7,956	8,319	7,591	6,960
7,845	4,530	6,640	8,667	6,507	7,426
46,338	46,928	94,031	64,786	74,694	57,792

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Rapson No. 1	McLaughlin	Bloom
Thickness of bed	4 ft.	6 ft.	5 ft.
Kind of opening	Slope	Slope	Drift
Character of coal	Bituminous	Bituminous	Bituminous
January	4,056	1,590	1,819
February	2,427	1,400	1,551
March	979	1,692	1,627
April	859	1,977	1,635
May	1,393	2,115	1,138
June	1,046	1,952	1,051
July	2,199	1,869	1,426
August	3,271	2,207	754
September	3,674	1,620	986
October	2,776	2,203	897
November	5,280	Shut down	1,039
December	6,000	.....	1,200
Totals	33,960	18,625	15,123

LAS ANIMAS COUNTY, 1909—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Wootton	Stevens	Baldy	Southwestern	Jewel	Empire
5 ft.	5½ ft.	6 ft.	4½ ft.	3 ft.	6 ft.
Drift	Drift	Drift	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
1,168	206	882	781	300	2,125
1,010	180	412	453	190	947
1,070	236	629	Idle	Idle	485
847	210	543	....	....	Closed
700	118	364	....	....	....
890	65	378	....	....	....
1,076	73	120	....	....	....
822	69	387	....	....	....
875	132	414	658	....	....
1,086	298	486	734	....	2,510
1,927	228	840	1,512	....	2,528
1,526	236	768	1,605	....	5,648
12,997	2,051	6,223	5,743	490	14,243

PRODUCTION OF LAS ANIMAS COUNTY, 1909—Concluded.

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

Name of mine	Peerless	Valley	
Thickness of bed	6 ft.	4 ft.	
Kind of opening	Slope	Slope	
Character of coal	Bituminous	Bituminous	Total Tonnage
January	.....	.....	403,593
February	.....	.....	360,748
March	.....	.....	397,155
April	.....	.....	337,353
May	.....	.....	322,420
June	.....	.....	323,626
July	.....	.....	357,254
August	.....	.....	380,796
September	.....	.....	402,355
October	.....	.....	426,063
November	.....	.....	464,875
December	18,200	2,576	480,602
Totals	18,200	2,576	4,656,840

PRODUCTION OF LA PLATA COUNTY, 1909.

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

Name of mine	Hesperus	Perin's Peak	City	
Thickness of bed	5 ft.	4 to 6 ft.	3 ft.	
Kind of opening	Slope	Drift	Tunnel	Total
Character of coal	Semi-bit.	Bituminous	Bituminous	Tonnage
January	6,042	7,059	3,328	16,429
February	3,091	4,249	2,099	9,439
March	6,092	5,527	2,471	14,090
April	2,257	5,635	2,735	10,627
May	1,515	6,242	2,147	9,904
June	3,022	3,024	2,220	8,266
July	3,219	3,588	2,664	9,471
August	3,946	4,100	2,723	10,769
September	2,553	4,200	2,165	8,918
October	4,134	5,523	2,204	11,861
November	6,273	5,365	2,602	14,240
December	6,560	6,129	2,817	15,506
Totals	48,704	60,641	30,175	139,520

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Cameo	Book Cliff	Palisades
Thickness of bed	6 ft.	7 ft.	3½ to 4½ ft.
Kind of opening	Drift	Drift	Drift
Character of coal	Semi-bit.	Semi-bit.	Semi-bit.
January	4,649	1,331	1,027
February	3,136	1,312	737
March	2,465	1,072	786
April	1,703	1,630	725
May	1,178	944	582
June	2,061	625	474
July	2,535	857	274
August	3,217	852	430
September	4,991	555	733
October	5,057	1,123	900
November	11,204	930	1,370
December	11,300	878	1,800
Totals	53,496	12,109	9,838

MESA COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Stokes 3 ft. 8 in. Slope Semi-bit.	P. V. 6 ft. Drift Semi-bit.	Garfield 7 ft. Slope Semi-bit.	Grand View 4 ft. Semi-bit.	Wearing 4 ft. Semi-bit.	Total Tonnage
700	698	.....	.....	.....	8,405
480	635	.....	.....	.....	6,300
370	884	.....	.....	.....	5,577
320	601	.....	.....	.....	4,979
220	400	.....	.....	.....	3,324
150	Idle	.....	.....	.....	3,310
170	Idle	.....	.....	.....	3,836
185	Idle	.....	.....	.....	4,684
450	374	.....	.....	.....	7,103
550	757	.....	.....	.....	8,387
625	1,370	.....	.....	.....	15,499
595	1,000	3,500	2,161	2,100	23,334
4,815	6,719	3,500	2,161	2,100	94,738

PRODUCTION OF MONTEZUMA COUNTY, 1909.

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

Name of mine	Mancos
Thickness of bed	2½ ft.
Kind of opening	Drift
Character of coal	Lignite
Yearly	500
Total	500

PRODUCTION OF PITKIN COUNTY, 1909.

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

Name of mine	Spring Gulch	Marion	
Thickness of bed	6 to 9 ft.	6 to 8 ft.	
Kind of opening	Slope	Drift	Total
Character of coal	Bituminous	Bituminous	Tonnage
January	13,261	4,505	17,766
February	13,522	3,350	16,872
March	16,738	3,449	20,187
April	15,076	4,242	19,318
May	11,298	3,655	14,953
June	15,875	Idle	15,875
July	16,321	Idle	16,321
August	15,042	2,354	17,396
September	11,525	4,112	15,637
October	5,371	5,907	11,278
November	11,611	3,583	15,194
December	14,724	5,348	20,072
Totals	160,364	40,505	200,869

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Oak Hills
Thickness of bed	10 ft.
Kind of opening	Slope
Character of coal	Bituminous
January	1,900
February	2,000
March	3,000
April	3,800
May	4,750
June	2,423
July	4,414
August	7,827
September	8,247
October	11,321
November	11,273
December	13,936
Totals	74,891

ROUTT COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Pinnacle 16 ft. Slope Bituminous	James 12 to 14 ft. Slope Bituminous	Juniper 4 to 5½ ft. Slope Bituminous	McKinley 14 ft. Slope Bituminous	Total Tonnage
389	.....	.....	.....	2,289
1,211	.....	.....	.....	3,211
440	.....	.....	.....	3,440
Idle	.....	.....	.....	3,800
526	.....	.....	.....	5,276
1,695	.....	.....	.....	4,118
1,541	.....	.....	.....	5,955
1,336	.....	.....	.....	9,163
933	.....	.....	.....	9,180
716	.....	.....	.....	12,037
558	.....	.....	.....	11,831
2,500	2,100	2,318	1,000	21,854
11,845	2,100	2,318	1,000	92,154

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Parkdale	Puritan	Golden Ash
Thickness of bed	12 ft.	10½ ft.	7½ to 9 ft.
Kind of opening	Slope	Shaft	Shaft
Character of coal	Lignite	Lingnite	Lignite
January	9,203	7,337	6,812
February	4,702	7,713	5,455
March	5,861	7,343	4,085
April	5,566	4,964	2,205
May	5,047	4,603	1,334
June	4,754	4,505	1,024
July	4,424	4,859	1,171
August	4,321	3,746	1,183
September	5,561	5,555	2,404
October	9,213	7,754	3,500
November	8,665	8,791	4,276
December	9,957	11,630	6,780
Totals	77,274	78,800	40,229

WELD COUNTY, 1909.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Lehigh	Frederick	Evans	Shamrock	Ideal	Warwick
5 ft.	7 to 8½ ft.	8 ft.	11 ft.	8 to 11 ft.	7½ ft.
Slope	Slope	Shaft	Shaft	Slope	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
3,336	1,987	3,076	1,046	933	947
2,864	1,763	2,444	827	625	755
2,805	1,886	1,397	412	900	560
2,218	1,103	1,617	262	213	335
1,846	2,000	841	293	257	387
1,255	2,500	890	196	247	342
1,945	1,300	1,419	137	199	425
2,755	1,850	779	469	584	358
4,082	2,500	998	593	461	97
5,827	3,500	Idle	431	438	715
6,858	3,500	1,600	600	500	589
6,993	3,800	2,850	600	775	2,159
42,784	27,689	17,911	5,866	6,132	7,669

PRODUCTION OF WELD COUNTY, 1909—Concluded.

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

Name of mine	Firestone	Washington	
Thickness of bed	7 ft.	5 ft.	
Kind of opening	Shaft	Shaft	Total
Character of coal	Lignite	Lignite	Tonnage
January	250	.....	34,927
February	180	.....	27,328
March	110	.....	25,359
April	120	.....	18,603
May	126	.....	16,734
June	65	.....	15,778
July	63	.....	15,942
August	66	.....	16,111
September	68	.....	22,319
October	123	.....	31,501
November	140	.....	35,519
December	174	2,490	48,208
	1,485	2,490	308,329

PRODUCTION OF THE

SHOWING MONTHLY AND YEARLY

MINES REPORTING ONLY ANNUALLY

Months.	Boulder.	Delta.	Douglas.
January	123,636	4,443	.....
February	123,562	4,486	.....
March	114,542	3,422	.....
April	92,457	3,483	.....
May	75,357	2,283	.....
June	62,292	2,032	.....
July	54,228	2,405	.....
August	61,823	2,817	.....
September	113,024	3,815	.....
October	151,965	4,507	.....
November	184,613	5,703	.....
December	199,240	10,850	130
Totals	1,356,739	50,246	130

STATE OF COLORADO, 1909.

PRODUCTION OF EACH COUNTY.

GROUPED IN THE MONTH OF DECEMBER.

El Paso.	Fremont.	Garfield.	Gunnison.	Huerfano.	Jefferson.
32,970	62,655	19,332	36,498	160,015	13,558
29,328	55,290	18,998	22,647	118,087	12,329
31,138	30,790	22,015	39,249	104,353	13,684
28,098	54,126	19,527	41,603	135,913	12,550
22,671	41,113	14,911	46,853	151,099	11,127
18,767	49,667	18,457	62,349	145,704	10,646
18,940	51,425	21,698	64,376	170,366	18,085
18,404	48,042	14,864	64,506	170,259	18,982
20,838	36,954	12,937	58,395	146,267	18,310
27,159	43,592	18,164	56,424	149,014	18,932
30,025	61,710	16,085	55,770	194,217	21,531
36,444	77,439	17,206	49,155	222,130	23,663
314,782	612,803	214,194	597,825	1,867,424	193,397

PRODUCTION OF THE

SHOWING MONTHLY AND YEARLY

MINES REPORTING ONLY ANNUALLY

Months.	Jackson.	Las Animas.	La Plata.
January	.....	403,593	16,429
February	.....	360,748	9,439
March	.....	397,155	14,090
April	.....	337,353	10,627
May	.....	322,420	9,904
June	.....	323,626	8,266
July	.....	357,254	9,471
August	.....	380,796	10,769
September	.....	402,355	8,918
October	.....	426,063	11,861
November	.....	464,875	14,240
December	2,000	480,602	15,506
Totals	2,000	4,656,840	139,520
Production from mines not reporting (estimated)			
Grand total			

STATE OF COLORADO, 1909—Continued.

PRODUCTION OF EACH COUNTY.

GROUPED IN THE MONTH OF DECEMBER.

Mesa.	Montezuma.	Pitkin.	Routt.	Weld.	Total Tonnage.
8,405	.....	17,766	2,289	34,927	936,516
6,300	.....	16,872	3,211	27,328	808,625
5,577	.....	20,187	3,440	25,359	825,001
4,979	.....	19,318	3,800	18,603	782,437
3,324	.....	14,953	5,276	16,734	738,025
3,310	.....	15,875	4,118	15,778	740,887
3,836	.....	16,321	5,955	15,942	810,302
4,684	.....	17,396	9,163	16,111	838,616
7,103	.....	15,637	9,180	22,319	876,052
8,387	.....	11,278	12,037	31,501	970,884
15,499	.....	15,194	11,831	35,519	1,126,812
23,334	500	20,072	21,854	48,208	1,248,333
94,738	500	200,869	92,154	308,329	10,702,490
					70,000
					10,772,490

PRODUCTION OF THE STATE OF COLORADO, 1909 —Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF THE DIFFERENT VARIETIES.

COAL CLASSIFIED.

	Anthracite.	Bituminous.	Semi-Bituminous.	Lignite.	Total Tonnage.
January	714	647,754	82,957	205,091	936,516
February	None	548,335	67,743	192,547	808,625
March	None	595,119	45,159	184,723	825,001
April	None	563,915	66,814	151,708	782,437
May	None	557,774	54,362	125,889	738,025
June	8,377	558,999	66,028	107,483	740,887
July	9,373	625,057	68,677	107,195	810,302
August	13,512	644,987	64,797	115,320	838,616
September	10,466	633,047	58,048	174,491	876,052
October	7,414	665,863	68,050	229,557	970,884
November	8,088	751,685	95,351	271,688	1,126,812
December	1,575	820,797	117,776	308,185	1,248,333
Totals	59,519	7,613,332	855,762	2,173,877	10,702,490
Unclassified coal (estimated)					70,000
Grand total					10,772,490

PRODUCTION BY COUNTIES.

SHOWING INCREASE AND DECREASE.

Counties.	1908.	1909.	Increase.	Decrease.
Boulder	1,133,323	1,356,739	223,416	.....
Delta	29,951	50,246	20,295	.....
Douglas	1,250	130	.....	1,120
El Paso	329,297	314,782	.....	14,515
Fremont	626,069	612,803	.....	13,266
Garfield	208,958	214,194	5,236	.....
Gunnison	506,015	597,825	91,810	.....
Huerfano	1,534,347	1,867,424	333,077	.....
Jefferson	165,969	193,397	27,428	.....
Jackson	.....	2,000	2,000	.....
Las Animas	4,347,085	4,656,840	309,755	.....
La Plata	154,546	139,520	.....	15,026
Mesa	62,792	94,738	31,946	.....
Montezuma	441	500	59	.....
Pitkin	239,010	200,869	.....	38,141
Routt	3,000	92,154	89,154	.....
Weld	360,954	308,329	.....	52,625
Mines not reporting, product estimated	70,000	70,000	.....	.....
Total tonnage	9,773,007	10,772,490	.....	.....

Increase in 1909, 999,483 tons.

TABLE

SHOWING THE TOTAL PRODUCTION OF DIFFERENT COMPANIES OPERATING TWO OR MORE MINES IN THE YEAR 1909.

	Character of Coal and Number of Mines.								
Companies.	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 and Iron Co.....	17	2,919,946	4	437,099	1	51,643	..	.....	3,408,688
Victor-American Fuel Co.....	6	1,416,924	2	91,360	..	.....	..	.....	1,508,284
Northern Coal and Coke Co.....	4	84,371	..	.....	..	.....	10	768,001	852,372
Rocky Mountain Fuel Co.....	6	349,712	3	137,071	..	.....	..	.....	486,783
Chicosa Fuel Co.....	3	445,712	..	.....	..	.....	..	.....	445,712
Cedar Hill Coal and Coke Co.....	3	164,863	..	.....	..	.....	..	.....	164,863
Parkdale Fuel Co.....	..	.....	..	.....	..	.....	2	156,074	156,074
Pike's Fuel Co.....	..	.....	..	.....	..	.....	2	148,414	148,414
Huerfano Coal Co.....	2	142,941	..	.....	..	.....	..	.....	142,941
National Fuel Co.....	..	.....	..	.....	..	.....	2	137,325	137,325
Green Canon Coal Co.....	2	136,839	..	.....	..	.....	..	.....	136,839
Continental Fuel Co.....	1	94,031	..	.....	..	.....	1	23,882	117,913
Rapson Coal Mining Co.....	1	33,960	..	.....	..	.....	1	44,539	78,449
Union Coal and Coke Co.....	2	78,475	..	.....	..	.....	..	.....	78,475

COKE PRODUCTION, 1909.

Name of Operators.	Location of Ovens	Counties	Number of Ovens	Tonnage
Colorado Fuel and Iron Co.	Cardiff	Garfield	167	65,675
Colorado Fuel and Iron Co.	Crested Butte	Gunnison	154	28,818
Colorado Fuel and Iron Co.	Segundo	Las Animas	800	364,389
Colorado Fuel and Iron Co.	Tabasco	Las Animas	302	142,167
Colorado Fuel and Iron Co.	Starkville	Las Animas	190	76,025
Colorado Fuel and Iron Co.	Sopris	Las Animas	272	75,492
Colorado Fuel and Iron Co.	Tercio	Las Animas	600	12,147
Carbon Coal and Coke Co.	Cokedale	Las Animas	350	190,025
Victor-American Fuel Co.	Hastings	Las Animas	189	70,399
Victor-American Fuel Co.	Gray Creek	Las Animas	28	27,430
Victor-American Fuel Co.	Delagua	Las Animas	160	13,128
American Smelting and Refining Co.	Durango	La Plata	28	10,898
			3,240	1,076,593

REMARKS.

Not all the above enumerated ovens were in operation.

The coal of Huerfano county is classified as bituminous, but is non-coking

The Cardiff ovens are supplied by the Spring Gulch mine.

The Segundo ovens are supplied by the Primero mine.

The Durango ovens are supplied by the Perin's Peak mine.

COKE PRODUCTION, 1909.

BY COMPANIES AND COUNTIES.

Companies	Total Number of Ovens	Total Tonnage
Colorado Fuel and Iron Co	2,485	764,713
Carbon Coal and Coke Co	350	190,025
Victor-American Fuel Co	377	110,957
American Smelting and Refining Co	28	10,898
Totals	3,240	1,076,593

Counties	Number of Ovens	Total Tonnage
Las Animas	2,891	971,202
Garfield	167	65,675
Gunnison	154	28,818
La Plata	28	10,898
Totals	3,240	1,076,593

List of Fatal Accidents for 1909

UNDERGROUND

FATAL ACCIDENTS IN 1909.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
Jan. 2	Jno. Pasquine	Italian	Miner	31	Married	1	Alpine	Gunnison	Fall of roof
Jan. 5	John Mehas	Greek	Miner	21	Single	..	Forbes	Las Animas	Fall of rock
Jan. 6	Ramon Padelli	Mexican	Miner	23	Married	..	Morley	Las Animas	Fall of roof
Jan. 6	Abe Martinez	Mexican	Miner	..	Married	1	Brodhead	Las Animas	Fall of roof
Jan. 15	Mike Beato	Italian	Driver	..	Single	..	Cokedale	Las Animas	Squeezed between car and rib
Jan. 23	Germano Yab	Austrian	Miner	38	Married	..	Hastings	Las Animas	Fall of roof
Jan. 25	Richard Hutchinson	English	Miner	..	Married	1	Matchless	Boulder	Fall of roof
Feb. 2	Alex Parr	Colored	Miner	38	Single	..	Black Diamond	Las Animas	Fall of roof
Feb. 2	J. Fransenni	Italian	Miner	..	Single	..	Round Oak	Huerfano	Fall of roof
Feb. 4	Steve Badovich	Austrian	Miner	25	Single	..	Berwind	Las Animas	Fall of roof
Feb. 8	Martin Sarmora	Mexican	Miner	26	Married	2	Pryor	Huerfano	Fall of rock
Feb. 11	Andrew Bissola	Italian	Driver	23	Married	2	Starkville	Las Animas	Struck by a car
Feb. 26	Rudolf Janusovitch	Austrian	Miner	35	Single	..	Berwind	Las Animas	Electrocuted by a trolley wire
Mch. 3	Nicolito Senna	Italian	Miner	35	Married	3	Berwind		Fall of roof
Mch. 10	K. Ito	Japanese	Miner	..	Married	2	Brodhead	Las Animas	Fall of rock
Mch. 13	W. L. Garghio	Italian	Miner	30	Married	1	Cokedale	Las Animas	Fall of roof
Mch. 27	Alex Ravera	Italian	Miner	32	Married	..	Monarch	Las Animas	Fall of roof
Apr. 6	Nick Gurule	American	Miner	55	Married	2	Cokedale	Boulder	Fall of roof
Apr. 21	James Rodenbuch	Mexican	Miner	58	Married	1	Perin's Peak	La Plata	Fall of roof
May 4	Domenico Cervelli	Italian	Miner	35	Married	2	Hastings	Las Animas	Gas explosion

May	18	James Rees	English	Driver	22	Single	..	..	Matchless	Boulder....Caught between car and roof
May	21	Pete Novelli	Italian	Miner	42	Married	3	..	Hastings	Las Animas.....Fall of rock
May	21	John Magon	Austrian	Miner	32	Married	1	..	Hezron	Huerfano.....Fall of rock
May	22	Juan Juran	Mexican	Miner	47	Widower	..	..	Hezron	Huerfano.....Fall of rock
May	24	B. Gliocani	Italian	Miner	45	Married	2	..	Pryor	Huerfano.....Fall of rock
June	3	M. Uchigama	Japanese	Miner	46	Married	5	..	Huerfano	Huerfano .....Fall of drawslate
June	3	Walter Glynn	Colored	Miner	31	Married	..	..	Berwind	Las Animas.....Fall of rock
June	3	Sakachie Morisaki	Japanese	Miner	42	Married	..	..	Primrose	Las Animas..Fall of drawslate
June	4	Giacomo Davide	Italian	Miner	52	Married	..	..	Starkville	Las Animas.....Fall of rock
June	4	Stanislaw Starakicwice.	Pole	Miner	19	Single	..	..	Rockvale	Fremont.....Struck by derailed cars
June	5	Walter White	American	Miner	28	Single	..	..	Paonia	Delta .....Fall of drawslate
June	9	Frank Mohinaris	Italian	Driver	21	Single	..	..	Delagua	Las Animas.....Fall of rock
June	10	Daniel Porter	American	Pit boss	41	Widower	..	2	Huerfano	Huerfano.....Fall of rock
June	14	James W. Colbert	American	Painter	30	Married	..	..	Oak Hills	Routt...Struck by a run-a-way car
June	14	William Smith	English	Painter	30	Single	..	..	Oak Hills	Routt...Struck by a run-a-way car
June	15	Claude Roberts	French	Miner	61	Single	..	..	La Belle	Las Animas.....Fall of rock
June	21	B. Phillipi	Italian	Miner	23	Married	1	..	Forbes	Las Animas.....Fall of rock
June	23	Frank Cantani	Italian	Miner	23	Single	..	..	Toltec	Huerfano.....Fall of rock
July	6	Thomas Smircich	Austrian	Miner	32	Married	4	..	Toller	Las Animas.....Gas explosion
July	6	Angelo Grizenti	Austrian	Miner	30	Married	..	..	Toller	Las Animas.....Gas explosion
July	6	Clementi Grizenti	Austrian	Miner	24	Single	..	..	Toller	Las Animas.....Gas explosion
July	6	Venuto Moser	Austrian	Miner	35	Single	..	..	Toller	Las Animas.....Gas explosion
July	6	Joe Fontenari	Austrian	Miner	42	Single	..	..	Toller	Las Animas.....Gas explosion
July	6	Louis Leonardelli	Austrian	Miner	24	Single	..	..	Toller	Las Animas.....Gas explosion

FATAL ACCIDENTS IN 1909—Continued.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
July 6	John Obrezzi	Slav	Miner	43	Married	..	Toller	Las Animas	Gas explosion
July 6	Antonio Bronk	Slav	Miner	26	Single	..	Toller	Las Animas	Gas explosion
July 6	Albert Noah	American	Cager	24	Single	..	Toller	Las Animas	Gas explosion
July 8	Pete Valden	Austrian	Miner	53	Married	..	Midway	Huerfano	Fall of roof
July 17	Charles Decamillo	Italian	Miner	35	Widower	1	Midway	Huerfano	Fall of roof
July 21	A. Lessano	Italian	Miner	20	Single	..	Primero	Las Animas	Fall of coal
Aug. 3	Carmen Delost	Italian	Miner	32	Married	..	Morley	Las Animas	Fall of coal
Aug. 9	Chas. Harris	American	Miner	30	Single	..	Tioga	Huerfano	Fall of drawslate
Aug. 9	Jno. Gregosich	Austrian	Miner	40	Married	2	Sopris	Las Animas	Fall of rock
Aug. 10	Geo. M. Chatfield	American	Cager	22	Married	..	Capitol	Boulder	Caught between cage and shaft bottom
Aug. 11	Frank Ratkovich	Slav	Miner	....	Married	2	Rugby	Huerfano	Fall of roof
Aug. 17	Oro Zenaro	Italian	Miner	46	Single	..	Alpine	Gunnison	Fall of rock
Aug. 17	Joe Vailia	Italian	Miner	39	Married	3	Berwind	Las Animas	Fall of drawslate
Aug. 19	Henry Harrison	American	Miner	24	Married	1	Big Four	Huerfano	Fall of rock
Aug. 28	Henry Claude Petitalot	French	Miner	23	Single	..	Monarch	Boulder	Fall of rock
Aug. 28	John H. Anderson	American	Miner	40	Married	1	Last Chance	El Paso	Ovecome by gas from shot
Sept. 10	Joe Shade	Colored	Miner	36	Single	..	Alpine	Gunnison	Crushed between cage and shaft timber
Sept. 11	W. B. Walford	American	Driver	22	Single	..	Rapson No. 1	Las Animas	Caught between car and mule
Sept. 16	Frank Carboni	Italian	Miner	33	Single	..	Berwind	Las Animas	Fall of roof
Sept. 30	Egilio de Marco	Italian	Miner	33	Single	..	Rex No. 2	Boulder	Fall of top coal
Oct. 17	Tony Aller	Austrian	Miner	50	Single	..	Bunker Hill	Huerfano	Fall of rock

Oct.	22	Y. Ito	Japanese	Miner	40	Married	..	.....	Primrose	Las Animas—Fall of drawslate
Oct.	25	Chas. Pepper	American	Miner	37	Married	..	.....	Morley	Las Animas—Fall of rock
Nov.	9	Emil Fliam	Italian	Miner	24	Married	1	...	Spring Gulch	Pitkin—Fall of rock
Nov.	9	Felice Marino	Mexican	Miner	35	Marrier	2	.....	Morley	Las Animas—Fall of roof
Nov.	10	Felix Chiaro	Italian	Miner	29	Married	..	.....	Delagua	Las Animas—Fall of rock
Nov.	11	Leo Pucell	Slav	Miner	24	Married	1	.....	Delagua	Las Animas—Fall of rock
Nov.	14	Frank Pecka	Austrian	Fire-boss and Shot Firer	43	Single	..	.....	Morley	Las Animas—Dust explosion
Nov.	16	J. Nakhaoga	Japanese	Miner	25	Married	2	.....	Gray Creek	Las Animas—Fall of rock
Nov.	20	Sam Gherna	Italian	Miner	33	Single	..	.....	Rockdale	Fremont—Fall of rock
Nov.	20	Oresto Ladoline	Italian	Miner	25	Married	3	.....	Oakdale	Huerfano—Missed shot
Nov.	20	Pete Lonzee	Italian	Miner	25	Single	..	.....	Big Four	Huerfano—Fall of rock
Nov.	25	Frank Carbonich	Slav	Miner	38	Single	..	.....	Ludlow	Las Animas—Fall of rock
Nov.	30	Mike Radurch	Slav	Miner	27	Single	..	.....	Robinson	Huerfano—Fall of coal
Dec.	1	Simon Galusha	American	Miner	59	Widower	5	.....	Leyden	Jefferson—Fall of roof
Dec.	1	Dominic Dulgare	Italian	Miner	28	Married	3	.....	Berwind	Las Animas—Fall of top coal
Dec.	4	John Holly	American	Miner	32	Married	..	.....	Primero	Las Animas—Fall of coal
Dec.	7	George Ehler	German	Miner	40	Single	..	.....	Hesperus	La Plata—Fall of drawslate
Dec.	8	Joseph Ceprini	Italian	Miner	29	Single	..	.....	Somerset	Gunnison—Fall of coal
Dec.	14	Bob Ramsay	American	Driver	25	Married	1	.....	Greenville	Las Animas—Dust explosion
Dec.	14	James Presco	Italian	Company man	38	Married	4	.....	Greenville	Las Animas—Dust explosion
Dec.	14	E. Romerez	Mexican	Miner	35	Married	..	...	Green Canon	Las Animas—Fall of rock
Dec.	18	Tony Lapinnas	Italian	Miner	35	Married	..	.....	Berwind	Las Animas—Fall of coal
Dec.	21	Fiano Archuleta	Mexican	Miner	25	Married	1	.....	Piedmont	Las Animas—Missed shot
Dec.	30	Frank Morich	Hungarian	Miner	27	Married	2	.....	Midway	Huerfano—Fall of coal

FATAL ACCIDENTS IN 1909—Concluded.

SURFACE.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
Jan. 29	Herbert Williams	Welsh	Machine oiler	24	Single	..	Starkville	Las Animas	Caught in gear wheels of machinery
May 13	John Feddish	Austrian	Company man	30	Single	..	Berwind	Las Animas	Run over by a railroad car
May 16	Evan Ablett	Welsh		20	Single	..	Magnet	Fremont	Struck by a plank in air shaft
Aug. 2	Oliver Fraser	American	Sinker	37	Married	2	Solar	Huerfano	Explosion of fire-damp in air shaft
Aug. 2	David Henderson	American	Sinker	45	Married	1	Solar	Huerfano	Explosion of fire-damp in air shaft
Sept. 20	Joe Bavelle	American	Company man	36	Married	..	Hastings	Las Animas	Fall of coal from chute
Oct. 9	Peter O. Nelson	Swede	Miner	41	Married	..	Morrison	Jefferson	Fall of coal from chute
Dec. 9	Ginsola Guilicio	Italian	Laborer	20	Single	..	Morley	Las Animas	Run over by car on tipple

Denver, Colo., July 24th, 1909.

Hon. John F. Shafroth,
Governor of the State of Colorado,
City.

Dear Sir:

Herewith I beg leave to submit to you my report on the explosion which occurred at the Toller mine on the morning of the 6th of July, 1909, and which resulted in the death of nine persons.

The Toller mine is situated in Road Canyon, three miles southwest from the Ludlow station of the C. & S. R. R., and about twelve miles northwesterly from the town of Trinidad, in Las Animas county. It is owned and operated by the Cedar Hill Coal & Coke Company, whose headquarters are in Denver. The officials in charge are D. M. Harrington, general manager; David Davis, general superintendent, and Emory Fisher, local superintendent.

The mine is opened by two vertical shafts, one for hoisting and the other for both air and escape-way. They are located about 300 feet apart and sunk to a depth of 352 feet to what is locally known as the "Berwind" coal bed. The main shaft has three compartments, timbered with 8-inch "square sets," and is equipped with automatic dumping cages fitted with the latest safety appliances. The air shaft is 6′x8′ 8″ in size, and provided with a substantial stairway separated from the air passage by a strong wooden partition, with safety platforms at regular intervals from top to bottom. Twenty feet to the south of the shaft's collar is a 5′x11′ Clifford ventilating fan with steel casings enclosed within absolutely fireproof concrete walls, and constructed and arranged so that the fan can be made to either force or exhaust as required. The fan is built to run as high as 200 revolutions per minute, but the excavated territory being of small dimensions, it was regulated to a speed of 78, at which rate it produces 25,000 cubic feet of air per minute, and which is more than a sufficient quantity to keep the workings clear of all gases and in a safe condition until the mine attains to much larger proportions than its present area, when the fan speed will, of course, be increased proportionate to the development of the mine, or as conditions require.

The coal is of the coking variety and the bed varies from 5 to 6 feet in thickness, dipping three degrees to the southwest. It gives off "methane," or "marsh" gas very freely, and which is very noticeable in all the faces of most of the advanced workings by its loud buzzing as it issues from the coal bed.

Mode of working is the double entry room and pillar, and the present workings consist of four pairs of entries and six rooms. The furthest point yet reached will not exceed 1,200 feet from the shaft bottom.

The total number of persons employed underground at the time of the accident was forty.

The fan had been put into commission only two weeks prior to the explosion, as up to that time the mine had been ventilated by a natural current generated by a difference of temperatures of the air in the two shafts created by steam pipes and steam exhausts used temporarily to operate the pump until the permanent electric equipments were installed. Even with this crude method they had managed by judicious conduction of the air current to keep the workings clear of gas accumulations.

Up to the time of the explosion, the fan was "forcing," and consequently the hoisting shaft was the outlet, a very unscientific system of ventilating a mine producing firedamp in such quantities as in the case of this mine. By this method the gases from the workings are carried along the main haulageways, where the drivers and most of the roadmen are at work, to the main shaft. With the fan exhausting the firedamp and the impure air is forced away from the men into the back air courses and out through the air shaft, thus lessening the chances for an explosion and increasing the sanitary conditions of the mine.

On the day of the accident, I was inspecting the South Canon mine, Garfield county, and received notice of the disaster at 4:45 p. m. I took the first available train and arrived at Tollerburg, which is the name of the camp of the mine, late on the evening of the 7th. From my investigation I learned that a few minutes before seven o'clock on the morning of the 6th of July, nine men, consisting of the cager and eight miners, entered the cage and descended into the mine. When the cage was about half way to the bottom, 176 feet from the surface, a body of firedamp was encountered and was ignited by a naked light, causing an explosion and which resulted in killing the entire crew of men.

From the testimony of those who were present at the time, the deceased miners all had safety lamps, and only the cager had a naked light which he always used to work with. Therefore, it is reasonable to believe that the ignition was due to his lamp. Supt. Fisher, the official in charge of the mine, upon being questioned as to the cause of the explosion, stated that July 4th was observed on the 5th, and therefore the mine had been shut down completely on that day and the night following. That on the morning of the 5th, between five and five-thirty o'clock, the fan was stopped and remained so until within five or ten minutes previous to the explosion. He further stated that he arrived about a quarter to seven on the morning of

the 6th, and found only a small number of men had reported for work, and concluding there were not enough miners present to keep the drivers going, he decided to keep the mine idle another day and that he then informed the men there would be no work that day. He (Fisher) then walked over to the air shaft and started the fan, and while engaged in this act, the nine men entered the mine and the explosion followed.

Wm. Day, hoisting engineer, stated that the cage was descending slowly, and immediately when the fatal point was reached the winding rope suddenly relaxed to an extent of several feet, which was caused by the cage being held or forced upwards by the pressure of the explosion from below while the drum was still in motion. The instant he noticed that the tension was off the rope, he stopped the engine and the cage dropped at once to the point where the rope had slackened. Volumes of black smoke were issuing out of the shaft. He then realized what had happened. In a few seconds after the force of the explosion had spent itself, the signal bell rang 2 and 1. The signal to hoist men being 3 and 1, Day thought the men were still alive and were trying to give the hoisting signal, and knowing that they could live but a short time in the afterdamp-laden atmosphere, he tried to lift the cage, hoping to save the men. He made repeated efforts and applied increased head of steam each time, but it was ineffectual, as some obstruction had fallen upon the cage, blocking it against the shaft timber, which the power of the engine could not overcome. It was then decided to lower the cage, which was done without any difficulty. In the meantime Supt. Fisher, George Wallace, Sandro Sanden and other employes entered the mine through the air shaft, and upon reaching the foot of the hoisting shaft about twenty minutes after the explosion, they found the bodies of the deceased lying upon the floor of the cage. Some in such positions that their heads and shoulders, and others with their legs, hanging over the ends of the cage. They were all, according to Day's statement, more or less mangled, excepting Noah, the cager, and every one was burned to some extent. It is possible that Noah lived and was conscious long enough to ring the bell, but some were of the opinion that the bell ringing was caused by debris, stirred by the blast, falling through the shaft and striking the bell wire lever at the bottom.

The damage to the property was not very heavy and consisted of eight or ten falls of roof at different places in the entries, aggregating about 200 tons of rock, and a few pit cars were demolished. Both shafts practically escaped injury.

Judging from the rapid rate the gas was escaping at the "faces," I would think that the mine had become at least half-filled with firedamp during the time that the fan had ceased operating, about twenty-five and a half consecutive hours before the explosion. It is possible that the accumulation of gas was

such that its outward edge was close to the bottom of the shaft, and when the fan started the air current, the gas was forced ont in a body and met the men. If the fan had been exhausting at the time, as it should have been, it is very probable that the gas would have been forced away from the hoisting shaft before the men had reached the bottom, and as all the miners had safety lamps and were carrying no naked lights, very likely they would have discovered the gas as soon as overtaken in the haulageways, and they would have retreated to a place of safety, thus avoiding the accident.

Mr. E. S. Davis, the regular fireboss, who acted also as mine foreman, was absent on a vacation since July 3rd, and Mr. Fisher, in response to questions, stated that he intended to act as fireboss until his return.

Although the mine workings were small in extent, it nevertheless would have taken at least one hour to make the necessary fireboss' examination of all the workings, consequently had a sufficient number of men reported for work that morning to justify operating the mine, it is obvious that they would have been kept idle for the first hour of the shift until such an examination could have been completed and the fireboss' report made known.

Alex Osvick, pumpman, stated to me that he heard Fisher telling the men that the mine was not going to work. He also stated that some of the men who were killed were not present when Fisher announced "no work," and that they appeared at the shaft after Fisher had gone to the fan house. It is customary at coal mines for the miners to go in on days the mine is idle and prepare their coal for the time hoisting operations are resumed.

By section 4 of the mining law it is provided: "All mines generating firedamp shall be kept free from standing gas, and the working places 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." Whether or not the statement of the superintendent to some of the men was equivalent to a caution to the men not to enter the mine, I will not attempt to say, but the statement by the superintendent in the miners' language that "the mine is not working" means that the mine is not hoisting coal, and it appears from the statements of employes that miners did enter and were permitted to mine on days when there was no hoisting of coal. Just what the men who entered the mine understood cannot be determined. However, the language of the statute is "that there shall be an examination by the fireboss before any workmen are allowed to enter the mine." Therefore it is clear that the explosion was due to the disregard of the officials in charge of the mine of the plain provisions of the law, and whether this disregard was due to incompetency or lack of care on the part of these officials, the sad result is the same.

About two months before the accident the mine was examined by this department and all the provisions of the statute at that time were being complied with, and at the time of the accident the mine was equipped for safety as I have heretofore set forth.

Following is a table containing the names, etc., of the victims of this accident:

Name	Nationality	Occupation	Age	Single or Married
Thomas Smircich	Austrian	Miner	32	Married, 3 boys and 1 girl
John Obrezzi	Slavonian	Miner	43	Married, wife in old country
Antonio Bronk	Slavonian	Miner	26	Single
Angelo Grizenti	Austrian	Miner	30	Married, wife in old country
Clementi Grizenti	Austrian	Miner	24	Single
Venuto Moser	Austrian	Miner	35	Single
Joe Fontenari	Austrian	Miner	42	Single
Louis Leonardelli	Austrian	Miner	24	Single
Albert Noah	American	Cager	24	Single

Respectfully submitted,

(Signed) JOHN D. JONES,
State Inspector of Coal Mines

The establishing of the following rules at the Toller mine have been recommended by this department, which, if enforced, will safeguard against the repetition of such an explosion:

(1) You should have a specially constructed lamp house, the same arranged and provided with the equipments for oiling, cleaning, locking, storing, etc., all the safety lamps.

(2) The exclusive charge of the handling of the lamps should be entrusted to a man or men, employed especially for such purpose and who are thoroughly competent in such capacity.

(3) See that a thorough examination is made of the mine by a competent fireboss every morning, or any other time, and that all places are safe and free from gas before the men enter the mine.

(4) The fireboss should return to the surface before the men are lowered into the mine, until a fireboss station is established in the main intake air way in the vicinity of the shaft bottom. This station could be safely located at inside end of the shaft's double parting, or at the entrance to your slope air courses.

(5) Should the fan stop running, withdraw all the men from the mine at once.

(6) Keep the fan running as exhaust continuously, so that the gases are carried away from the main haulageways. Should anything happen to the fan, which would necessitate its

cessation for repairs, or otherwise for any length of time, do not permit even the fireboss to enter the mine until the fan, when restarted, will have run sufficient time to clear the gases away.

(7) Do not allow any but locked safety lamps beyond the lamp station.

(8) Should an emergency arise whereby the hoisting shaft is temporarily made the up-cast, forbid the use of naked lights below the surface.

(9) Forbid the men to carry matches, or pipes, in the mine.

(10) I recommend the use of the Wolf lamp, exclusively.

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Simpson	Mitchell	Vulcan
Thickness of bed	7½ ft.	6 ft.	6 ft.
Kind of opening	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite
January	14,598	8,940	5,253
February	7,253	2,449	1,932
March	9,266	2,815	1,126
April	Idle	Idle	Idle
May	account of strike.		"
June	941	"	"
July	2,185	"	"
August	5,426	"	"
September	6,040	"	1,878
October	10,180	"	4,686
November	12,597	"	5,625
December	12,500	"	5,250
Totals	80,986	14,204	25,750

BOULDER COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Acme	Rex No. 1	Rex No. 2	Hecla	Industrial	Gorham
6 ft.	6½ ft.	5 ft.	5 ft.	5½ ft.	5½ ft.
Shaft	Shaft	Shaft	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
17,740	17,311	3,380	9,417	12,411	11,422
11,432	13,839	2,404	6,815	8,870	11,041
6,233	9,744	1,638	3,063	4,868	7,135
Idle	Idle	Idle	Idle	95	210
"	"	"	"	1,544	3,030
"	"	"	"	4,188	5,652
125	80	812	732	7,233	6,293
136	1,553	718	1,742	9,665	7,226
192	5,254	866	4,394	10,471	10,173
Idle	7,636	1,689	6,251	9,834	10,882
"	8,928	2,472	6,842	11,029	10,509
"	9,250	2,400	6,750	11,000	10,500
35,858	73,595	16,379	46,006	91,208	94,073

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Standard	Monarch No. 1	Monarch No. 2
Thickness of bed	6 to 9 ft.	4 to 8 ft.	4½ to 8 ft.
Kind of opening	Shaft	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite
January	20,647	9,730	5,298
February	17,026	9,645	6,437
March	9,560	6,860	5,339
April	98	52	46
May	3,427	1,046	69
June	5,960	1,475	44
July	6,981	1,708	33
August	7,596	2,443	101
September	7,431	3,616	50
October	11,212	5,683	None
November	14,117	7,417	1,143
December	15,000	10,000	3,500
Total	119,055	59,675	22,060

BOULDER COUNTY, 1910—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Capitol	Centennial	Summit	Nonpareil	Fox	Matchless
6 ft.	6½ ft.	5 ft.	9 to 10 ft.	8 ft.	4½ ft.
Shaft	Shaft	Shaft	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
12,536	4,600	1,975	7,256	Idle	1,755
10,493	3,480	1,395	4,260	Idle	1,955
8,501	1,120	1,790	3,875	Idle	970
Idle	Idle	Idle	Idle	Idle	Idle
Idle	Idle	Idle	498	Idle	Idle
1,128	8	Idle	513	Idle	Idle
1,834	Idle	Idle	694	Idle	Idle
2,658	Idle	Idle	1,480	Idle	Idle
3,060	306	950	1,718	Idle	Idle
4,105	600	1,115	1,752	Idle	Idle
6,830	940	1,260	1,511	Idle	Idle
6,850	950	1,500	1,700	12,405	Idle
57,995	12,004	9,985	25,257	12,405	4,680

PRODUCTION OF BOULDER COUNTY, 1910—Concluded.

SHOWING MONTHLY AND YEARLY PRODUCTION OF EACH MINE IN TONS OF 2000 POUNDS.

Name of mine	Strathmore	Sunnyside	
Thickness of bed	.....	4 to 5 ft.	
Kind of opening	Shaft	Shaft	Total
Character of coal	Lignite	Lignite	Tonnage
January	2,815	.....	167,084
February	2,151	.....	122,877
March	2,242	.....	86,145
April	Idle	....	501
May	Idle	.....	9,614
June	Shut down	.....	19,909
July	indefinitely	.....	28,710
August		.....	40,744
September		.....	56,399
October		.....	75,625
November		.....	91,220
December		3,905	113,460
Totals	7,208	3,905	812,288

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	King
Thickness of bed	10 ft.
Kind of opening	Slope
Character of coal	Bituminous
January	6,995
February	4,291
March	4,291
April	3,296
May	2,986
June	3,229
July	3,505
August	3,990
September	4,826
October	6,614
November	5,404
December	6,000
Totals	55,427

DELTA COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Black Diamond	Paonia	Cedaredge	
16 ft.	9 ft.	7 to 8 ft.	
Drift	.....	.....	Total
Bituminous	Bituminous	Bituminous	Tonnage
95	.....	.....	7,090
104	.....	.....	4,395
55	.....	.....	4,346
103	.....	.....	3,399
45	.....	.....	3,031
32	.....	.....	3,261
27	.....	.....	3,532
160	.....	.....	4,150
305	.....	.....	5,131
484	.....	.....	7,098
311	.....	.....	5,715
300	2,888	3,575	12,763
2,021	2,888	3,575	63,911

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Curtis	Rapson No. 2
Thickness of bed	17 ft.	7 to 9 ft.
Kind of opening	Shaft	Shaft
Character of coal	Lignite	Lignite
January	9,781	6,901
February	9,133	6,527
March	6,652	3,964
April	7,456	5,256
May	6,342	5,023
June	4,406	1,243
July	5,466	1,550
August	6,181	1,660
September	8,446	5,827
October	7,835	7,080
November	8,157	7,189
December	8,200	7,200
Totals	88,055	59,390

EL PASO COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Pikeview 9 to 14 ft. Shaft Lignite	Danville 6 to 18 ft. Slope Lignite	Patterson 16 ft. Shaft Lignite	Austin Bluffs 7 ft. Shaft Lignite	Franceville 6 ft. Slope Lignite	Total Tonnage
2,737	9,844	3,019	2,380	284	34,946
7,800	3,250	3,086	2,225	200	32,221
7,592	3,885	2,568	1,114	50	25,825
9,753	3,994	2,133	825	60	29,477
12,024	3,513	1,743	750	45	29,440
9,207	2,509	685	450	50	18,550
8,100	2,046	none	371	70	17,573
9,649	3,076	450	531	54	21,601
10,747	4,004	907	738	60	30,729
9,945	3,100	1,752	1,585	150	31,447
10,755	3,067	2,111	2,275	200	33,754
10,500	3,200	2,950	2,270	250	34,570
108,809	45,488	21,404	15,514	1,473	340,133

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Rockvale	Coal Creek	Fremont
Thickness of bed	3½ ft.	3½ ft.	3½ ft.
Kind of opening	Shaft	Slope	Shaft
Character of coal	Semi-bit.	Semi-bit.	Semi-bit.
January	22,592	12,102	15,295
February	23,020	10,714	14,889
March	8,922	8,012	6,443
April	14,157	10,797	6,769
May	21,163	8,447	6,841
June	22,922	6,477	6,691
July	22,003	9,318	8,142
August	19,393	10,235	11,948
September	19,139	10,916	13,798
October	16,625	11,799	12,093
November	21,572	12,425	11,807
December	21,000	12,000	2,500
Totals	232,508	123,242	117,216

FREMONT COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Brookside	Chandler	Radiant	Magnet	Emerald	Colo. Central
5 ft. 6 in.	5 ft.	3 ft. 8 in.	4½ ft.	3 ft.	5½ ft.
Slope	Shaft	Slope	Slope	Slope	Slope
Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.	Semi-bit.
5,675	9,598	.....	2,660	2,100	2,093
6,487	8,944	.....	2,862	1,600	2,627
8,235	7,086	.....	3,692	850	2,830
7,077	7,757	.....	2,152	800	2,434
5,013	7,962	re-opened	2,064	900	2,264
3,706	7,610	786	2,095	1,186	2,448
none	7,932	735	2,468	1,186	1,976
none	6,644	1,992	3,594	1,750	2,580
none	8,143	1,954	3,437	1,601	1,751
none	9,262	2,293	3,121	1,921	2,109
none	10,144	3,553	3,022	1,994	2,818
none	10,000	4,000	3,500	2,050	2,500
36,193	101,082	15,313	34,667	17,938	28,430

PRODUCTION OF FREMONT COUNTY, 1910—Concluded.

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

Name of mine	Williamsburg Slope	Willie	
Thickness of bed	3 ft. 4 in.	3 ft 2 in.	
Kind of opening	Slope	Slope	Total
Character of coal	Semi-bit.	Semi-bit.	Tonnage
January	200	355	72,670
February	225	166	71,534
March	idle	205	46,275
April	200	171	52,314
May	200	188	55,042
June	250	108	54,279
July	250	84	54,094
August	300	164	58,600
September	325	222	61,286
October	325	311	59,859
November	300	330	67,965
December	300	330	58,180
Totals	2,875	2,634	712,098

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Vulcan	Midland
Thickness of bed	.....	6 to 7 ft.
Kind of opening	Drift	Drift
Character of coal	Bituminous	Bituminous
January	.....	2,126
February	.....	3,135
March	.....	4,398
April	.....	6,329
May	.....	4,690
June	.....	6,721
July	.....	6,695
August	900	6,120
September	952	6,633
October	1,314	6,725
November	1,794	6,962
December	1,800	7,000
Totals	6,760	67,534

GARFIELD COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Keystone 2 ft. Slope Bituminous	South Canon 15 ft. Drift Bituminous	Diamond 16 ft. Drift Bituminous	Total Tonnage
221	3,993	3,000	9,340
227	3,694	3,000	10,056
100	1,504	4,000	10,002
87	1,620	4,000	12,036
closed down	3,844	400	8,934
..	3,012	450	10,183
..	2,582	400	9,677
..	4,050	500	11,570
..	4,585	1,200	13,370
..	4,125	1,000	13,164
..	4,041	1,200	13,997
..	4,000	1,500	14,300
635	41,050	20,650	136,629

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Somerset	Crested Butte	Floresta
Thickness of bed	21 ft. 10 in.	14 ft.	3 ft.
Kind of opening	Slope	Drift	Slope
Character of coal	Bituminous	Bituminous	Anthracite
January	21,914	6,271	Not
February	17,007	8,376	produc-
March	21,776	6,329	ing
April	22,198	6,869	2,584
May	25,182	7,493	9,466
June	19,526	9,764	6,939
July	26,389	9,895	8,557
August	22,635	10,870	9,665
September	13,657	10,712	8,219
October	11,605	11,016	8,396
November	23,679	8,222	7,154
December	25,000	12,000	8,000
Totals	250,568	107,817	68,980

GUNNISON COUNTY, 1910—Concluded.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Alpine	Kubler	Porter	Horace	Bulkley	
5 & 7 ft.	.....	15 ft.	3 ft. 4 in.	7 ft.	
Shaft	Drift	Drift	Slope	Slope	Total
Semi-Bitum.	Semi-Bitum.	Bituminous	Anthracite	Bituminous	Tonnage
4,009	2,428	2,565	886	2,690	40,763
3,758	2,658	3,325	1,103	2,403	38,630
7,226	4,585	4,864	399	787	45,966
9,534	5,018	4,147	126	599	51,075
7,694	4,071	5,710	650	2,574	62,840
8,004	4,219	4,631	1,105	1,418	55,606
6,989	4,516	5,473	1,100	1,579	64,498
6,443	3,713	6,048	1,344	2,528	63,246
10,382	6,343	5,867	1,267	4,419	60,866
9,708	6,211	5,307	997	5,569	58,809
7,264	Closed	4,650	1,429	5,112	57,510
7,500	down	5,000	1,200	5,560	64,260
88,511	43,762	57,587	11,606	35,238	664,069

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Robinson	Rouse	Walsen
Thickness of bed	7 ft.	6 ft.	7 ft.
Kind of opening	Slope	Slope	Slope
Character of coal	Bituminous	Bituminous	Bituminous
January	17,507	20,586	11,850
February	19,537	18,845	13,639
March	10,777	21,585	14,644
April	13,273	15,109	13,397
May	18,887	17,045	9,532
June	18,499	21,404	13,860
July	19,638	21,805	12,873
August	16,644	16,258	7,279
September	18,787	18,025	10,301
October	17,089	19,889	12,895
November	18,492	21,791	12,901
December	17,000	20,000	13,000
Totals	206,130	232,342	146,171

HUERFANO COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Pictou	Hezron	Cameron	Maitland	Ravenwood	Midway
					3 beds—6,
9 ft.	5 ft.	3½ ft.	5 ft.	2 ft. 10 in.	6 and 4½ ft.
Slope	Slope	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
12,380	11,453	6,177	5,446	4,678	21,155
12,386	11,850	6,683	5,913	4,369	19,395
10,935	12,188	4,876	3,109	2,716	24,038
13,729	7,813	7,027	6,995	3,823	16,486
13,876	8,574	6,555	7,522	3,532	17,700
14,563	12,630	6,119	7,897	3,569	24,020
14,643	10,993	5,299	6,902	4,236	24,355
11,719	6,129	6,016	7,663	4,184	17,582
12,626	10,591	5,363	7,493	4,453	16,896
11,280	7,746	5,340	7,447	4,985	20,962
11,062	10,426	5,378	6,722	5,740	21,764
12,000	8,000	5,300	7,000	5,500	20,000
151,199	118,393	70,133	80,109	51,785	244,353

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Oakdale	Pryor	Rugby
Thickness of bed	10 to 14 ft.	4, 7 and 6 ft.	4 ft.
Kind of opening	Slope	Slope	Slope
Character of coal	Bituminous	Bituminous	Bituminous
January	21,027	11,182	8,406
February	15,475	10,206	7,035
March	10,885	10,964	7,470
April	14,815	7,636	4,836
May	21,300	9,336	6,791
June	18,490	8,815	6,115
July	18,031	7,578	4,916
August	18,307	7,672	4,290
September	12,669	7,948	4,257
October	13,020	8,805	5,470
November	23,021	10,860	4,940
December	21,500	11,000	5,000
Totals	208,540	112,002	69,526

HUERFANO COUNTY, 1910—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Toltec	Champion	Pinon	Huerfano	Big Four	Round Oak
					3 ft. 4 in.
2½ to 4½ ft.	3½ ft.	3 to 4 ft.	4 to 5 ft.	8 ft.	to 4½ ft.
Slope	Slope	Shaft	Shaft	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
5,916	.....	9,797	8,607	8,731	5,922
6,192	.....	10,201	7,718	7,614	5,167
2,332	.....	9,975	2,967	9,577	1,109
6,419	.....	5,533	4,823	12,472	1,439
6,452	.....	6,823	6,374	10,360	1,866
6,220	.....	7,920	6,374	12,755	1,554
6,293	.....	9,395	6,661	8,868	2,085
4,755	.....	6,246	5,981	4,152	4,458
5,017	.....	6,853	6,097	9,275	6,425
5,563	.....	7,582	5,100	10,576	4,972
6,377	.....	7,690	6,298	13,267	5,679
6,650	4,299	7,500	6,300	13,000	5,600
68,186	4,299	95,515	73,300	120,647	46,276

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Tioga	Sunnyside	Gordon	Ideal
Thickness of bed	5½ ft.	7 ft.	5½ ft.	3½ ft.
Kind of opening	Slope	Slope	Slope	Drift
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous
January	5,005	7,099	3,967	7,526
February	5,405	6,527	3,375	7,126
March	2,865	4,238	3,224	9,065
April	3,682	3,613	1,684	9,109
May	5,351	6,732	2,890	8,575
June	5,968	7,745	2,991	8,205
July	5,992	9,740	2,980	8,614
August	2,260	6,553	1,955	6,728
September	6,108	5,539	2,188	9,248
October	6,837	6,714	2,490	9,236
November	5,806	7,912	3,322	9,813
December	5,800	7,900	3,500	10,000
Totals	61,079	80,312	34,566	103,245

HUERFANO COUNTY, 1910—Concluded.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Beacon	Black Canon	Bunker Hill	Caddell	Rockland	
.....	3 ft. 8 in.	5½ ft.	4½ ft.	6 ft.	
Slope	Drift	Drift	Slope	Shaft	Total
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Tonnage
2,882	1,051	3,826	.....	.....	222,176
2,867	1,048	3,221	.....	.....	211,794
1,662	1,331	2,387	.....	.....	184,919
1,800	730	Idle	.....	.....	176,243
2,300	2,700	1,228	.....	.....	202,301
1,500	2,276	2,985	.....	.....	222,474
550	1,150	2,625	.....	.....	216,222
76	None	1,922	.....	.....	168,829
603	None	2,500	.....	.....	189,262
720	875	2,108	.....	.....	197,701
739	1,983	3,238	.....	.....	225,221
750	2,000	3,150	4,100	500	226,349
16,449	15,144	29,190	4,100	500	2,443,491

PRODUCTION OF JACKSON COUNTY, 1910.

SHOWING YEARLY PRODUCTION OF THE MINE IN TONS OF 2,000 LBS.

Name of mine	Coalmont	
Thickness of bed	65 ft.	
Kind of opening	Shaft	Total
Character of coal	Semi-Bit.	Tonnage
December	3,000	3,000
Totals	3,000	3,000

PRODUCTION OF JEFFERSON COUNTY, 1909.

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

Name of mine	Leyden	White Ash	
Thickness of bed	9 ft.	15 ft. 8 in.	
Kind of opening	Shaft	.....	Total
Character of coal	Lignite	Lignite	Tonnage
January	19,077	.....	19,077
February	15,451	.....	15,451
March	18,238	.....	18,238
April	20,800	.....	20,800
May	20,580	.....	20,580
June	20,008	.....	20,008
July	17,217	.....	17,217
August	19,540	.....	19,540
September	19,442	.....	19,442
October	21,114	.....	21,114
November	20,600	.....	20,600
December	10,000	1,000	11,000
Totals	222,067	1,000	223,067

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Berwind	Starkville	Morley	Sopris
Thickness of bed	6 ft.	5 to 7 ft.	5 to 9 ft.	5 ft.
Kind of opening	Drift	Drift	Slope	Drift
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous
January	31,738	24,387	38,050	13,306
February	34,104	25,677	33,644	12,936
March	39,914	29,582	38,311	13,762
April	39,023	24,392	38,915	13,231
May	38,856	27,788	36,970	13,408
June	38,215	28,243	36,554	11,781
July	34,065	27,203	34,613	11,306
August	34,703	29,230	32,144	12,824
September	34,425	27,953	33,109	12,844
October	33,238	7,895	30,785	11,728
November	30,747	5,955	35,744	10,468
December	34,000	8,300	31,300	12,000
Totals	423,028	266,605	420,139	149,594

LAS ANIMAS COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Frederick	Tabasco	Primero	Tercio	Engle	Delagua
7t ft.	8 ft.	6 to 8 ft.	5 to 7 ft.	5 to 7 ft.	6 to 7½ ft.
Drift	Slope	Drift	Drift	Drift	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
30,140	3,601	34,262	Idle	2,135	55,759
31,993	3,172	14,243	485	9,381	45,706
35,481	2,623	21,279	5,006	14,972	51,023
36,820	2,055	22,234	5,326	9,949	50,078
39,801	none	22,862	7,008	12,801	50,064
40,353	161	23,845	8,076	11,462	50,397
35,438	1,788	19,930	7,610	11,940	49,898
30,582	1,448	19,642	7,660	10,070	58,283
38,532	2,600	23,143	6,939	14,219	56,253
33,942	3,363	21,779	6,607	11,048	32,391
34,452	1,477	23,528	5,086	12,108	21,939
34,500	4,400	25,000	7,000	12,000	35,000
422,034	26,688	271,747	66,803	132,085	556,791

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Hastings	Gray Creek	Bowen	Cokedale
Thickness of bed	6 to 9 ft.	5 ft.	6 ft.	5 ft.
Kind of opening	Slope	Drift	Drift	Slope
Character of coal	Bitumonius	Bituminous	Bituminous	Bituminous
January	27,240	20,618	23,966	35,045
February	21,946	17,476	22,554	29,490
March	24,737	22,007	23,933	32,905
April	27,463	20,955	21,062	30,827
May	25,990	20,440	21,306	27,816
June	27,417	20,806	24,549	28,001
July	25,984	19,736	23,106	27,391
August	25,046	23,032	21,413	29,070
September	24,714	21,712	23,130	28,222
October	25,584	21,797	26,566	25,960
November	23,184	19,902	24,534	26,510
December	25,000	20,000	25,000	28,000
Totals	304,305	248,481	281,119	349,237

LAS ANIMAS COUNTY, 1910—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Piedmont	La Belle	Majestic	Beacon Green Canon	Thor Suffield	Greenville
		5 to 9 ft. and			
4½ ft.	4 ft	3 to 3½ ft.	4 to 4 ft. 4 in.	5½ ft.	4½ to 6½ ft.
Slope	Drift	Drift	Slope	Drift	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
22,009	2,251	7,443	7,992	9,494	12,164
23,258	2,478	5,815	7,752	9,161	9,891
26,288	2,586	7,028	9,300	12,786	13,909
24,684	2,099	6,620	8,021	13,023	12,401
26,055	1,212	6,606	5,294	12,009	12,640
27,337	387	5,522	6,663	5,513	12,400
24,941	Closed	5,206	4,314	7,268	9,523
24,086	.....	7,000	4,526	7,954	11,113
22,984	.....	6,576	5,712	9,601	11,909
22,928	.....	6,085	6,790	7,741	10,925
25,485	.....	7,355	6,726	10,706	13,247
25,500	.....	7,400	6,900	10,500	13,246
295,555	11,013	78,656	79,990	115,756	143,368

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Toller	Black Diamond	Forbes	Kenneth
Thickness of bed	6 to 7 ft.	3 to 4 ft.	5½ ft.	4½ to 8 ft.
Kind of opening	Shaft	Slope	Drift	Drift
Character of coal	Bituminous	Bituminous	Bituminous	Bituminous
January	8,708	2,446	17,400	7,619
February	7,012	3,317	16,630	7,227
March	8,463	4,066	19,356	8,972
April	9,270	3,281	16,716	6,572
May	9,319	4,189	17,716	6,585
June	10,587	3,823	14,822	7,466
July	11,778	4,039	14,957	6,715
August	10,744	4,030	16,472	6,732
September	11,890	3,449	14,733	7,810
October	12,096	3,637	15,383	8,699
November	12,469	4,554	13,815	10,042
December	15,250	4,503	14,000	9,500
Totals	127,586	45,334	192,000	93,939

LAS ANIMAS COUNTY, 1910—Continued.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Ludlow	Primrose	Brodhead	Rapson No. 1	Empire	Peerless
4 to 5 ft.	4 ft.	4 ft.	4 ft.	5 to 7 ft.	4 ft. 8 in.
Drift	Slope	Slope	Slope	Slope	Slope
Bituminous	Bituminous	Bituminous	Bituminous	Bituminous	Bituminous
8,253	8,151	5,200	6,345	5,535	1,800
8,384	7,869	3,450	6,393	5,899	1,000
9,645	8,314	3,250	5,107	6,437	708
6,827	7,309	3,770	1,059	4,206	900
9,205	7,420	3,500	4,177	5,479	800
10,046	6,088	3,400	5,648	6,338	1,100
9,119	5,664	3,500	4,714	6,327	1,200
9,291	4,660	3,500	4,259	4,447	1,200
8,744	4,102	2,745	4,570	6,611	900
8,039	4,307	2,055	5,767	6,532	1,500
8,459	4,778	650	6,593	5,936	1,300
9,000	5,000	Closed	6,600	6,500	1,500
105,012	73,662	35,020	61,232	70,247	13,908

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Thompson Valley	Bloom	Wootton
Thickness of bed	4 ft.	5 and 3 ft.	5 ft.
Kind of opening	Slope	Drift	Drift
Character of coal	Bituminous	Bituminous	Bituminous
January	500	1,417	2,424
February	700	1,211	3,694
March	720	1,325	6,200
April	Not producing	1,246	132
May	Not producing	1,153	400
June	Not producing	1,253	3,089
July	Not producing	1,549	3,343
August	Not producing	1,537	6,312
September	Not producing	1,430	7,886
October	Name changed	1,724	7,647
November	to Burnwell	2,249	7,569
December	7,580	2,300	7,800
Totals	9,500	18,394	56,496

LAS ANIMAS COUNTY, 1910—Concluded.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Baldy 5½ to 6 ft. Slope Bituminous	Turner 4 ft. 5 in. ..... Bituminous	Stevens 5½ ft. Drift Bituminous	South-western 4½ ft. Slope Bituminous	McLaughlin 3 to 6½ ft. Slope Bituminous	Total Tonnage
933	.....	269	1,711	.....	480,311
612	.....	149	861	.....	435,570
621	.....	67	Idle	.....	510,683
438	.....	47	1,499	.....	472,450
324	.....	Not working	2,005	.....	481,198
363	.....	Not working	2,953	.....	484,658
66	148	Not working	2,306	.....	456,685
191	1,200	Not working	2,445	.....	466,846
328	1,890	Not working	2,745	.....	484,410
658	2,723	Not working	3,884	.....	431,803
1,020	1,922	Not working	4,503	.....	425,012
1,000	2,000	Not working	4,500	3,959	466,038
6,554	9,883	532	29,412	3,959	5,595,664

PRODUCTION OF LA PLATA COUNTY, 1910.

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

Name of mine.....	Perin's Peak	Hesperus	City	San Juan	
Thickness of bed...	2 to 6 ft.	5 ft.	3 ft., 4 in.	3½ ft.	
Kind of opening....	Slope	Drift	Tunnel	Drift & Slope	Total
Character of coal..	Bituminous	Semi-Bitum.	Bituminous	Bituminous	Tonnage
January	6,421	5,838	3,046	.....	15,305
February	5,900	5,613	2,510	.....	14,023
March	4,822	3,069	2,731	.....	10,622
April	5,297	2,959	2,420	.....	10,676
May	5,500	2,580	1,494	.....	9,574
June	4,900	2,270	2,007	New mine	9,177
July	5,300	1,620	2,058	1,131	10,109
August	5,500	1,997	756	1,328	9,581
September	6,185	2,397	607	2,032	11,221
October	6,328	4,209	1,336	2,261	14,134
November	7,450	3,739	1,478	1,607	14,274
December	7,500	3,250	1,500	1,500	13,750
Totals	71,103	39,541	21,943	9,859	142,446

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Cameo	Book Cliff	Palisade
Thickness of bed	6 ft.	14 ft.	3 ft. 10 in. to 4
Kind of opening	Drift	Drift	Drift
Character of coal	Semi-Bitum.	Semi-Bitum.	Semi-Bitum.
January	11,870	1,258	1,959
February	5,377	1,384	1,270
March	7,436	908	1,687
April	7,234	965	1,532
May	5,600	718	1,701
June	3,300	870	1,646
July	4,000	600	2,100
August	3,400	700	2,075
September	4,300	900	Idle
October	8,050	1,300	1,140
November	11,000	1,000	1,150
December	11,000	1,400	1,200
Totals	82,567	12,003	17,460

MESA COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Garfield	P. V.	Stokes	Grand View	Wearing	
ft. 4 in. 7½ ft.	6 ft.	3 ft. 8 in.	4 to 5 ft.	4½ ft.	
Slope	Drift	Slope		Slope	Total
Semi-Bitum.	Semi-Bitum.	Semi-Bitum.	Semi-Bitum.	Semi-Bitum.	Tonnage.
350	1,566	825	.....	.....	17,828
450	690	585	.....	.....	9,756
350	450	685	.....	.....	11,516
250	400	545	.....	.....	10,926
350	None	180	.....	.....	8,549
250	240	Idle	.....	.....	6,306
Idle	None	175	.....	.....	6,875
Idle	700	135	.....	.....	7,010
Idle	700	195	.....	.....	6,095
Idle	900	500	.....	.....	11,890
700	736	650	.....	.....	15,236
600	750	650	2,439	650	18,689
3,300	7,132	5,125	2,439	650	130,676

PRODUCTION OF PITKIN COUNTY, 1910.

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

Name of mine	Spring Gulch	Marion	
Thickness of bed	5 to 9 ft.	5 to 6 ft.	
Kind of opening	Slope	Drift	Total
Character of coal	Bituminous	Bituminous	Tonnage
January	13,797	4,129	17,926
February	13,979	3,799	17,778
March	12,280	5,891	18,171
April	15,109	4,431	19,540
May	16,064	4,544	20,608
June	15,796	4,615	20,411
July	18,064	4,680	22,744
August	18,340	2,620	20,960
September	16,480	3,042	19,522
October	15,415	3,680	19,095
November	14,788	3,243	18,031
December	15,500	3,500	19,000
Totals	185,612	48,174	233,786

PRODUCTION OF ROUTT COUNTY, 1910.

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

Name of mine.....	Oak Hills	Pinnacle	Juniper	James	McKinley	
Thickness of bed.....	7 to 10 ft.	11 to 16 ft.	6 ft.	.....	12 to 14 ft.	
Kind of opening...	Slope	Drift	Slope	Drift	Drift	
Character of coal....	Bitum.	Bitum.	Bitum.	Bitum.	Bitum.	Total.
January	13,534	4,200	1,184	973	791	20,682
February	10,553	2,515	1,093	1,422	628	16,211
March	14,760	2,613	1,403	108	.....	18,884
April	13,825	5,607	1,158	200	.....	20,790
May	10,137	6,020	1,518	150	.....	17,825
June	10,096	6,608	1,781	150	.....	18,635
July	4,960	5,827	1,456	Idle	439	12,682
August	6,754	6,383	4,717	Idle	1,595	19,449
September	6,803	7,728	6,500	Idle	1,779	22,810
October	9,809	8,446	7,316	Idle	1,661	27,232
November	9,207	11,002	7,123	Idle	1,455	28,787
December	10,000	11,000	8,000	Idle	1,175	30,175
Totals	120,438	77,949	43,249	3,003	9,523	254,162

PRODUCTION OF

SHOWING MONTHLY AND YEARLY PRODUCTION

Name of mine	Puritan	Parkdale	Lehigh	Golden Ash
Thickness of bed	10 ft.	10 ft.	5 ft.	7½ to 9 ft.
Kind of opening	Shaft	Slope	Shaft	Shaft
Character of coal	Lignite	Lignite	Lignite	Lignite
January	13,564	10,447	6,342	7,139
February	9,656	7,388	4,234	5,207
March	6,730	3,517	3,142	3,975
April	372	105	Idle	467
May	6,329	80	Idle	533
June	9,895	160	Idle	2,442
July	10,340	150	Idle	2,813
August	11,648	150	Idle	3,827
September	12,128	1,199	Idle	4,680
October	13,436	4,398	Idle	4,739
November	13,418	6,882	Idle	6,494
December	13,500	8,000	Idle	6,000
Totals	121,026	42,466	13,718	48,316

WELD COUNTY, 1910.

OF EACH MINE IN TONS OF 2,000 POUNDS.

Frederick	Evans	Ideal	Warwick	Shamrock	Firestone
7 to 8½ ft.	8 ft.	8 to 11 ft.	70½ ft.	9 ft.	7 ft.
Slope	Shaft	Slope	Shaft	Shaft	Shaft
Lignite	Lignite	Lignite	Lignite	Lignite	Lignite
4,000	2,941	775	1,690	883	200
700	3,260	704	Idle	804	225
64	1,745	340	Idle	268	185
423	Idle	129	150	357	32
Idle	Idle	200	231	251	183
Idle	Idle	217	450	142	85
Idle	Idle	117	900	153	74
Idle	832	480	1,211	455	327
Idle	2,057	715	1,538	684	260
Idle	2,015	746	1,401	514	343
Idle	1,726	1,340	1,672	905	508
Idle	2,000	1,400	1,500	1,100	500
5,187	16,576	7,163	10,743	6,516	2,922

PRODUCTION OF WELD COUNTY, 1910—Concluded.

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

Name of mine	Washington	Andrew	
Thickness of bed	5 ft.	11 ft.	
Kind of opening	Shaft	Shaft	Total
Character of coal	Lignite	Lignite	Tonnage
January	.....	.....	47,981
February	.....	.....	32,178
March	.....	.....	19,966
April	.....	.....	2,035
May	.....	.....	7,807
June	.....	.....	13,391
July	....	.....	14,547
August	.....	.....	18,930
September	.....	.....	23,261
October	.....	.....	27,592
November	.....	.....	32,945
December	3,534	1,300	38,834
Totals	3,534	1,300	279,467

PRODUCTION OF THE STATE OF COLORADO, 1910.

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

Counties	Boulder	Delta	El Paso	Fremont
January	167,084	7,090	34,946	72,670
February	122,877	4,395	32,221	71,534
March	86,145	4,346	25,825	46,275
April	501	3,399	29,477	52,314
May	9,614	3,031	29,440	55,042
June	19,909	3,261	18,550	54,279
July	28,710	3,532	17,573	54,094
August	40,744	4,150	21,601	58,600
September	56,399	5,131	30,729	61,286
October	75,625	7,098	31,447	59,851
November	91,220	5,715	33,754	67,965
December	113,460	12,763	34,570	58,180
Totals	812,288	63,911	340,133	712,098

PRODUCTION OF THE STATE OF COLORADO, 1910.

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

Counties	Garfield	Gunnison	Huerfano	Jefferson
January	9,340	40,763	222,176	19,077
February	10,056	38,630	211,794	15,451
March	10,002	45,966	184,919	18,238
April	12,036	51,075	176,243	20,800
May	8,934	62,840	202,301	20,580
June	10,183	55,606	222,474	20,008
July	9,677	64,498	216,222	17,217
August	11,570	63,246	168,829	19,540
September	13,370	60,866	189,262	19,442
October	13,164	58,809	197,701	21,114
November	13,997	57,510	225,221	20,600
December	14,300	64,260	226,349	11,000
Totals	136,629	664,069	2,443,491	223,067

PRODUCTION OF THE STATE OF COLORADO, 1910.

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

Counties	Jackson	Las Animas	La Plata	Mesa
January	.....	480,311	15,305	17,828
February	.....	435,570	14,023	9,756
March	.....	510,683	10,622	11,516
April	.....	472,450	10,676	10,926
May	.....	481,198	9,574	8,549
June	.....	484,658	9,177	6,306
July	.....	456,685	10,109	6,875
August	.....	466,846	9,581	7,010
September	.....	484,410	11,221	6,095
October	.....	431,803	14,134	11,890
November	.....	425,012	14,274	15,236
December	3,000	466,038	13,750	18,689
Totals	3,000	5,595,664	142,446	130,676

PRODUCTION OF THE STATE OF COLORADO, 1910.

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

Counties	Pitkin	Routt	Weld	Total Tonnage
January	17,926	20,682	47,981	1,173,179
February	17,778	16,211	32,178	1,032,474
March	18,171	18,884	19,966	1,011,558
April	19,540	20,790	2,035	882,262
May	20,608	17,825	7,807	937,343
June	20,411	18,635	13,391	956,848
July	22,744	12,682	14,547	935,165
August	20,960	19,449	18,930	931,056
September	19,522	22,810	23,261	1,003,804
October	19,095	27,232	27,592	996,563
November	18,031	28,787	32,945	1,050,267
December	19,000	30,175	38,834	1,124,368
Totals	233,786	254,162	279,467	12,034,887
Production from mines not reporting, estimated				70,000
Grand total				12,104,887

PRODUCTION OF THE STATE OF COLORADO, 1910.

SHOWING MONTHLY AND YEARLY PRODUCTION OF THE DIFFERENT VARIETIES.

Varieties	Lignite	Semi-Bituminous	Bituminous	Anthracite	Total Tonnage
January	269,088	102,773	800,432	886	1,173,179
February	202,727	93,319	735,325	1,103	1,032,474
March	150,174	72,671	788,314	399	1,011,558
April	52,813	80,751	745,988	2,710	882,262
May	67,441	77,936	781,850	10,116	937,343
June	71,858	75,078	801,868	8,044	956,848
July	78,047	74,094	773,367	9,657	935,165
August	100,815	77,763	741,469	11,009	931,056
September	129,831	86,503	777,984	9,486	1,003,804
October	155,778	91,877	739,515	9,393	996,563
November	178,519	94,204	768,961	8,583	1,050,267
December	197,864	87,619	829,685	9,200	1,124,368
Totals	1,654,955	1,014,588	9,284,758	80,586	12,034,887
Unclassified coal, estimated					70,000
Grand total					12,104,887

PRODUCTION BY COUNTIES.

SHOWING INCREASE AND DECREASE.

Counties	1909	1910	Increase	Decrease
Boulder	1,356,739	812,288	.....	544,451
Delta	50,246	63,911	13,665	.....
Douglas	130	.....	.....	130
El Paso	314,782	340,133	25,351	.....
Fremont	612,803	712,098	99,295	.....
Garfield	214,194	136,629	.....	77,565
Gunnison	597,825	664,069	66,244	.....
Huerfano	1,867,424	2,443,491	576,067	.....
Jefferson	193,397	223,067	29,670	.....
Jackson	2,000	3,000	1,000	.....
Las Animas	4,568,840	5,595,664	938,824	.....
La Plata	139,520	142,446	2,926	.....
Mesa	94,738	130,676	35,938	.....
Montezuma	500	.....	.....	500
Pitkin	200,869	233,786	32,917	.....
Routt	92,154	254,162	162,008	.....
Weld	308,329	279,467	.....	28,862
Mines not reporting, product estimated	70,000	70,000	.....	.....
Total tonnage	10,772,490	12,104,887		

Increase in 1910, 1,332,397 tons.

TABLE

SHOWING THE TOTAL PRODUCTION OF DIFFERENT COMPANIES OPERATING TWO OR MORE MINES IN THE YEAR 1910.

Companies.	Character of Coal and Number of Mines.								Totals in tons of 2,000 lbs.
	No. of Mines.	Bituminous or coking.	No. of mines.	Semi-Bituminous or non-coking.	No. of mines.	Anthracite.	No. of mines.	Lignite.	
The Colorado Fuel & Iron Co...	19	3,547,939	4	509,159	1	68,980	..	.....	4,126,078
Victor American Fuel Co.....	6	1,522,590	2	116,395	..	.....	..	.....	1,638,985
The Rocky Mountain Fuel Co...	5	484,372	3	166,940	..	.....	..	.....	651,312
The Northern Coal & Coke Co..	2	138,433	..	.....	..	.....	10	491,777	630,210
The Chicosa Fuel Co.....	3	530,292	..	.....	..	.....	..	.....	530,292
The National Fuel Co.....	2	195,746	..	.....	..	.....	4	245,227	440,973
The Carbon Coal & Coke Co.....	2	359,096	..	.....	..	.....	..	.....	359,096
The Cedar Hill Coal & Coke Co.	3	316,288	..	.....	..	.....	..	.....	316,288
The Huerfano Coal Co.....	2	178,312	..	.....	..	.....	..	.....	178,312
The Pike's Peak Fuel Co.....	..	.....	..	.....	..	.....	2	154,297	154,297
The Rapson Coal Mining Co.....	1	61,232	..	.....	..	.....	1	59,390	120,622
Union Coal & Coke Co.....	2	116,301	..	.....	..	.....	..	.....	116,301
Wootton Land & Fuel Co.....	2	66,379	..	.....	..	.....	..	.....	66,379
The Coryell Mine Leasing Co....	2	7,395	..	.....	.	.....	..	.....	7,395

COKE PRODUCTION, 1910.

Name of Companies.	Location of Ovens	Counties	No. of Ovens	Tonnage
Colorado Fuel & Iron Co.	Cardiff	Garfield	167	57,470
Colorado Fuel & Iron Co.	Crested Butte	Gunnison	154	24,655
Colorado Fuel & Iron Co.	Segundo	Las Animas	800	320,709
Colorado Fuel & Iron Co.	Tabasco	Las Animas	302	167,937
Colorado Fuel & Iron Co.	Starkville	Las Animas	190	82,298
Colorado Fuel & Iron Co.	Sopris	Las Animas	272	159,023
Colorado Fuel & Iron Co.	Tercio	Las Animas	600	86,147
Carbon Coal & Coke Co.	Cokedale	Las Animas	350	170,215
Victor American Fuel Co.	Hastings	Las Animas	189	63,998
Victor American Fuel Co.	Gray Creek	Las Animas	97	45,595
American Smelting & Refining Co.	Durango	La Plata	43	12,854
		Total	3,164	1,190,901

REMARKS.

Not all the above enumerated ovens were in operation.

The Cardiff ovens are supplied by the Spring Gulch mine.

The Segundo ovens are supplied by the Primero mine.

The Durango ovens are supplied by the Porter and San Juan mines.

The coal of Huerfano is classified as bituminous, but is non-coking.

COKE PRODUCTION, 1910.

BY COMPANIES AND COUNTIES.

Companies	Total Number of Ovens	Total Tonnage
Colorado Fuel & Iron Co	2,485	898,239
Carbon Coal & Coke Co	350	170,215
Victor American Fuel Co	286	109,593
American Smelting & Refining Co	43	12,854
	3,164	1,190,901

Counties	Total Number of Ovens	Total Tonnage
Las Animas	2,800	1,095,922
Garfield	167	57,470
Gunnison	154	24,655
La Plata	43	12,854
	3,164	1,190,901

SUMMARY OF COAL PRODUCTION.

FROM 1873 TO 1910, INCLUSIVE.

Year	Tons	Year	Tons
1873	69,977	1892	3,771,234
1874	87,372	1893	3,947,056
1875	98,838	1894	3,021,028
1876	117,666	1895	3,339,495
1877	160,000	1896	3,371,633
1878	200,630	1897	3,565,660
1879	322,732	1898	4,174,037
1880	375,000	1899	4,826,939
1881	706,744	1900	5,495,734
1882	1,161,479	1901	6,210,405
1883	1,220,593	1902	7,522,923
1884	1,130,024	1903	7,775,302
1885	1,398,796	1904	6,776,551
1886	1,436,211	1905	8,989,631
1887	1,791,735	1906	10,308,421
1888	2,185,477	1907	10,965,640
1889	2,400,629	1908	9,773,007
1890	3,075,781	1909	10,772,490
1891	3,512,632	1910	12,104,887

List of Fatal Accidents for 1910

UNDERGROUND

FATAL ACCIDENTS IN 1910.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
Jan. 5	Peter Rizzia	Italian	Miner	22	Single	..	Sopris	Las Animas	Fall of coal
Jan. 6	Matt Valmieck	Slav	Miner	41	Married	4	Bowen	Las Animas	Fall of drawslate
Jan. 12	Tony Midasco	Italian	Miner	41	Married	3	Frederick	Las Animas	Explosion of cap
Jan. 13	Y. Motto	Japanese			Single	..	Hastings	Las Animas	Struck by a motor
Jan. 13	Joe Smith	Pole	Miner	40	Single	..	Berwind	Las Animas	Fall of roof
Jan. 24	Elias Shasoff	Bulgarian	Miner	33	Married	4	Pikeview	El Paso	Suffocated from powder smoke
Jan. 24	George Nedelschoff	Bulgarian	Miner	22	Single	..	Pikeview	El Paso	Suffocated from powder smoke
Jan. 26	Sisacmoni Yashida	Japanese	Miner	42	Married	6	Walsen	Huerfano	Fall of drawslate
Jan. 27	George Dixon	American	Miner	15	Single	..	Kenneth	Las Animas	Fall of coal
Jan. 28	S. Turugori	Japanese	Miner	32	Married	1	Hastings	Las Animas	Fall of roof
Jan. 31	See report on the Primero explosion.								
Feb. 11	Mike Radulich	Slav	Company man	27	Married	1	Delagua	Las Animas	Caught between car and collar while riding
Feb. 12	Adam Grushinshi	Russian	Miner	39	Married	4	Standard	Boulder	Fall of roof
Feb. 14	S. Regretto	Italian	Miner	39	Single	..	Morley	Las Animas	Fall of rock
Feb. 15	Ben Maschic	Austrian	Miner	29	Single	..	Huerfano	Huerfano	Fall of roof
Feb. 15	Sam Moser	Austrian	Miner	21	Single	..	Huerfano	Huerfano	Fall of roof
Feb. 15	John Tierney	English	Miner	54	Married	5	Big Four	Huerfano	Fall of roof
Feb. 21	Petro Noier	Austrian	Miner	49	Married	4	Hastings	Las Animas	Fall of rock
Feb. 24	Joe Rolly	Italian	Miner	40	Married	..	Green Canon	Las Animas	Fall of rock
Mch. 1	Wm. Smaels	American	Nipper	35	Married	2	Primrose	Las Animas	Falling under trip of cars

Mch. 4	Mike Dailey	American	Pumpman	50	Single	..	Berwind	Las Animas	Caught between motor and car
Mch. 11	G. Thyrett	French	Miner	..	Married	3	Winger	Mesa	Fall of coal
Mch. 14	L. Gonzalez	Greek	Miner	49	Married	7	Toller	Las Animas	Fall of roof
Mch. 17	Redi Popovitch	Montenegrin	Miner	23		..	Berwind	Las Animas	Fall of rock
Mch. 23	Thomas Brandofer	German	Miner	33	Single	..	Matchless	Boulder	Fall of rock
Mch. 24	Mariano Sanchez	Mexican	Miner	40	Married	5	Englc	Las Animas	Fall of drawslate
Apr. 14	Tony de Angelo	Italian	Miner	23	Single	..	Primero	Las Animas	Fall of drawslate
Apr. 16	A. Medereage	Montenegrin	Miner	25	Single	..	Empire	Las Animas	Fall of roof
Apr. 22	John Slavic	Slav	Miner	35	Married	2	Delagua	Las Animas	Fall of coal
Apr. 25	S. Lee Butler	American	Miner	34	Single	..	Greenville	Las Animas	Fall of top coal
May 2	S. Bertuzzi	Italian	Miner	25	Single	..	Piedmont	Las Animas	Fall of coal
May 4	Andrew Jackson	Negro	Miner	29	Married	3	Primrose	Las Animas	Fall of rock
May 7	Joseph Silva	Italian	Miner	28	Single	..	Primrose	Las Animas	Fall of roof
May 9	Paul Kolatic	Russian	Miner	35	Married	1	Ravenwood	Huerfano	Struck by runaway car
May 10	Al Mosely	Negro	Miner	31	Married	..	Alpine	Gunnison	Fall of rock
May 12	L. de Jagama	Italian	Miner	19	Single	..	Majestic	Las Animas	Fall of rock
May 18	H. G. Newman	American	Miner	22	Single	..	Oak Hills	Routt	Fall of rock
May 24	Frank Smith	Austrian	Miner	24	Single	..	Rugby	Huerfano	Fall of rock
May 26	Frank Lenzini	Italian	Machine helper	32	Married	1	Toltec	Huerfano	Fall of rock
May 28	Emeric Korentus	Hungarian	Miner	47	Married	..	Pryor	Huerfano	Fall of rock
June 3	M. Guiterrez	Mexican	Miner	22	Single	..	Bowen	Las Animas	Fall of top coal
June 3	Innoccncio Trujillo	Mexican	Miner	23	Married	1	Bowen	Las Animas	Fall of top coal
June 11	Nick Berdar	Croatian	Driver	23	Single	..	Ideal	Huerfano	Run over by a trip of cars
June 13	Pete Mazeko	Russian	Miner	29	Single	..	Robinson	Huerfano	Fall of rock

FATAL ACCIDENTS IN 1910—Continued.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
June 13	Wm. Bradley	American	Miner	60	Married	1	Primero	Las Animas	Fall of roof
June 13	Harry Stordillis	Greek	Miner	30	Single	..	Standard	Boulder	Fall of roof
June 21	Mat Goydanich	Slav	Miner	30	Married	..	Forbes	Las Animas	Fall of drawslate
June 22	John Humphrey	Welsh	Timberman	40	Married	3	San Juan	La Plata	Fall of rock and coal
June 25	Sam Spencer	American	Miner	40		..	Starkville	Las Animas	Fall of drawslate
June 25	John Cavar	Slav	Miner	36	Single	..	Black Diamond	Las Animas	Fall of rock
June 27	Mike Mannick	Slav	Driver	23	Single	..	Pikeview	El Paso	Caught between cars
July 2	A. I. Hague	American	Miner	72	Single	..	Green Canon	Las Animas	Fall of coal
July 7	Raphael English	Italian	Miner	25	Single	..	Berwind	Las Animas	Fall of rock
July 7	Salvadore Donato	Italian	Miner	27	Single	..	Greenville	Las Animas	Fall of rock
July 12	Gaetano Filangi	Italian	Miner	33	Married	..	Pictou	Huerfano	Fall of rock
July 23	Carlo Ghigleri	Montenegrin	Miner	..	Single	..	Wootton	Las Animas	Fall of rock
July 23	Joe Ghigleri	Montenegrin	Miner	..	Single	..	Wootton	Las Animas	Fall of rock
July 23	Anton Genaro	Italian	Miner	40	Married	5	Starkville	Las Animas	Fall of rock
July 25	Frank Kuskovitch	Pole	Miner	31	Single	..	Greenville	Las Animas	Fall of rock
Aug. 5	John Cosmadakis	Greek	Miner	30	Married	4	Floresta	Gunnison	Fall of roof
Aug. 10	Hugh Young	Scotch	Mine laborer	66	Single	..	Coal Creek	Fremont	Struck by a trip of cars
Aug. 24	Louis Domenko	Austrian	Miner	30	Married	2	Porter	Gunnison	Fall of coal
Aug. 27	Metre Peavich	Montenegrin	Miner	24		..	Bowen	Las Animas	Fall of pot from roof
Sept. 7	A. J. Rains	Colored	Miner	40	Married	..	Sunnyside	Huerfano	Fall of rock and timber

Sept. 12	Bob Elias (alias Paul Flich)	Russian	Miner	36 to 40	.....	..	.....	Bowen	Las Animas	Fall of rock
Sept. 14	Richard Horsecroft	American	Driver	18	Single.....	..	.....	Chandler	Fremont	Fell under runaway car
Sept. 22	Joke Kelly	Slav	Miner	38	Married....	4	.....	Cameron	Huerfano	Fall of drawslate
Sept. 23	Fred Kos	Slav	Miner	34	Widower ..	2	.....	Brodhead	Las Animas	Fall of rock
Sept. 30	Peter Vasanelli	Italian	Miner	31	Married....	..	.....	Berwind	Las Animas	Crushed between motor and car
Sept. 30	Andrew Kovatz	Hungarian	Miner	20	Single.....	..	.....	Pinon	Huerfano	Fall of rock
Oct. 6	Henry Mavor	American	Dayman	41	Married....	2	.....	Robinson	Huerfano	Fall of drawslate
Oct. 7	George Danoff	Bulgarian	Miner	48	Married....	5	.....	Industrial	Boulder	Fall of rock
Oct. 8	See report on Starkville explosion.									
Oct. 10	J. Inone	Japanese	Miner	28	Single.....	..	.....	Primero	Las Animas	Fall of coal
Oct. 13	Joe Denardo	Italian	Miner	50	Married....	..	.....	Rockvale	Fremont	Fall of rock
Oct. 15	Joseph Fink	Austrian	Timberman	55	Single.....	..	.....	Leyden	Jefferson	Fall of rock
Oct. 18	Geo. Pasvenes	Greek	Driver	29	Single.....	..	.....	Standard	Boulder	Falling off car
Oct. 20	John Hotock	Slav	Miner	34	Married....	2	.....	Robinson	Huerfano	Struck by derailed car
Oct. 23	Frank Kaspar	Slav	Miner	25	Single.....	..	.....	Globe	Huerfano	Run over by a car
Nov. 1	Jas. McCoy	Scotch	Driver	35	Single.....	..	.....	Tioga	Huerfano	Run over by a car
Nov. 5	Arthur Denton	American	Driver	21	Single.....	..	.....	Thompson	Las Animas	Missed shot
Nov. 5	Ramer Officer	American	Miner	26	Single.....	..	.....	Thompson	Las Animas	Missed shot
Nov. 8	See report on the Delagua explosion.									
Nov. 15	John Manini	Italian	Miner	42	Married....	4	.....	Wootton	Huerfano	Fall of rock
Nov. ..	Pete Angelina	Austrian	Machine helper	32	Single.....	..	.....	Maitland	Huerfano	Fall of rock
Nov. 22	John Palmieri	Italian	Miner	..	Married....	..	.....	Fremont	Fremont	Suffocated by smoke
Nov. 22	Vincenzo Bonera	Italian	Miner	..	Single.....	..	.....	Fremont	Fremont	Suffocated by smoke

FATAL ACCIDENTS IN 1910—Concluded.

UNDERGROUND.

Date	Name of Person	Nationality	Occupation	Age	Single or Married	Number of Children	Name of Mine	County	Cause of Accident
Nov. 26	John Cowershaw	American	Fireboss	34	Married	2	Bowen	Las Animas	Fall of coal
Nov. 26	Nick Erkang	Hollander	Miner	22	Single	..	Cameron	Huerfano	Fall of rock
Nov. 30	Telesofore Costelli	Italian	Miner	25	Single	..	Ravenwood	Huerfano	Fall of rock
Dec. 8	Francis Lea	Italian	Miner	21	Single	..	Hastings	Las Animas	Fall of rock
Dec. 12	Mike De Salvo	Italian	Miner	19	Single	..	Rockvale	Fremont	Fall of rock
Dec. 14	Mike Kakis	Greek	Miner	26	Married	2	Puritan	Weld	Falling off ascending cage
Dec. 14	Thomas Abeyta	Mexican	Miner	46	Married	6	McLaughlin	Las Animas	Fall of rock and coal
Dec. 15	See report on the Leyden fire.								
Dec. 15	George Swallow	Slav	Machine runner	32	Married	..	Big Four	Huerfano	Struck by a run-away car
Dec. 15	John Pontil	Slav	Machine runner	28	Single	..	Big Four	Huerfano	Struck by a run-away car
Dec. 18	Samuel E. Higgins	American	Miner	35	Married	2	Golden Ash	Weld	Crushed between motor and rib
Dec. 19	George Scott	Colored	Miner	49	Married	2	Bowen	Las Animas	Fall of rock
Dec. 20	J. J. Anderson	American	Pipeman	27	Single	..	Starkville	Las Animas	Struck by a trip of cars
Dec. 20	Daniel Pachesca	Mexican	Miner	30	Married	1	Oakdale	Huerfano	Fall of coal
Dec. 23	George Roshoff	Bulgarian	Miner	35	Married	2	Primero	Las Animas	Fall of coal
Dec. 31	Anton Mortoratre	Spaniard	Miner	36		..	Wootton	Las Animas	Fall of rock

SURFACE.

Jan. 17	George Papas	Greek	Oiler	..	Single	..		Delagua	Las Animas	Struck by a sheave wheel
Feb. 20	Peter Enrietta	Italian	Dumper	52	Married	1		Spring Gulch	Pitkin	Struck by a car on the incline
June 10	Dan Silba	Mexican	Laborer	22	Single	..		Starkville	Las Animas	Fell under cart while hauling ashes
Dec. 15	W. C. Graves	American	Top Dumper	45	Widower	2		Evans	Weld	Falling down shaft

REPORT ON THE EXPLOSION AT THE PRIMERO MINE.

This mine is located in Smith Canyon, about eighteen miles nearly due west from the Town of Trinidad, Las Animas county, on the Colorado & Wyoming R. R. The property is owned and operated by the Colorado Fuel & Iron Co. The officials in charge are Messrs. E. H. Weitzel, general manager; James Thompson, division superintendent; Wm. Kilpatrick, local superintendent, and David Williams, deceased, a victim of the explosion, was pit boss.

The "Main North," which was the scene of the catastrophe, is the one most extensively worked, and was the largest producer of the group. It is opened by two parallel entries, haulage-way and air course, and which are of comparatively large areas. They enter upon the outcrop of the coal bed, and are driven nearly due north for a distance of 4,400 feet, at which point, for the sake of equalizing the division of the territory forward which is to be developed, the direction of the main entries from here on to the terminus, a distance of about 800 feet, is changed 30 degrees to the west. From the entrance of the mine, for a distance of 1,200 feet, the drift runs nearly level, but from here in the formation dips forward at a varying rate of from one to four per cent.

VENTILATION.

The ventilation is produced by a 12′ x 8′ direct connected Capell fan situated at the mouth of the main air course, and running as exhaust. Up to the time of the accident the air entered the mine along the main haulage-way. The main volume of air was "split" into three independent currents, as follows:

A-7 and 8, and A-9 and 10, and the remaining portion for the balance of the workings. On the date of the last inspection of the mine by this department, made December 17, 1909, by D. J. Griffiths, deputy inspector, who has charge of the mines in this district, the total volume of air entering the mine was 87,900 cubic feet per minute, and which was judiciously conducted through the various districts and workings, and he then found the mine in a safe condition.

MODE OF WORKING AND SHOT FIRING.

Mode of working the mine is the double entry room and pillar, and the hauling is done by mule and tail rope. There are twelve pairs of cross entries turned off the Main North, seven to the west which are classified as "A" entries, and five to the east designated as "B" entries, all of which are driven at distances of 600 to 800 feet apart, and at nearly right angle to the main and along the strike of the coal bed. The present workings are embraced within the area lying from A-7 inward on the west, and from B-7 on the east, and all other entries and

rooms from these points outward have been worked out and abandoned. All the coal, with the exception of some pillar work, is mined by undercutting with hand picks and then blasting. Pillar work is mostly done by pick and without powder. In 1904, realizing the great danger of dust explosions in the presence of shot-firing, at the suggestion of this department the Colorado Fuel & Iron Co. and the officials in charge readily consented to place shot-firers in all of their bituminous mines. Since then the method of firing has been as follows:

In the morning each miner takes in an amount of powder deemed sufficient for one shift's blasting. If he finds that he has taken in more than he needed for the day's work, he leaves the balance in his working place until the next day. The miners drill their holes and prepare the charge by placing the caps and fuse ready in the powder. They then leave the charge assigned to each blast in front of the respective holes, together with paper cartridges filled with adobe tamping of sufficient quantity to tamp each hole. The miners are not permitted to fire, nor even charge any shots. Between 5:30 and 6 o'clock p. m., when all the miners and other employes have left the mine, the two shot-firers enter and proceed to their respective districts and begin the work of charging and blasting. However, before charging they are supposed to examine the length of the undercutting, and if they find that the depth of any holes exceeds the depth of the mining, or, in other words, if the holes are drilled any distance on the solid, they refuse to charge them until the cutting is extended beyond the extreme points of the holes. The class of powder used for blasting was changed several months ago to one of the United States permissible ones tested at the Pittsburg Testing Plant and classified as "Aetna B" and is ranked among the lowest producers of flame. The Wolf safety lamp was used exclusively.

CONDUCTION OF WATER AND SPRINKLING.

There are two pumps used in the mine; one is located in the Second South, off A-7, and the other in a station made in the chain pillar between entries A-11 and A-12, about 500 feet from the connection of these entries with the Main North. Both pumps carry the water straight to the outside. The discharge pipe is laid along the floor of the main air course from A-12 to the outlet. The pipe leading from the pump in A-7 extends along A-8 haulage-way and connects with the joint discharge pipe in the vicinity of the entrance of A-8. The Main North Entry in the intervening space between the entrance and A-12 was sprinkled by means of a short pipe branching from the discharge in the air course and leading through every other crosscut 200 feet apart. A hose was then attached and used to water the intervening spaces between the pipes. Some of the pipes were conducted across the main entry close to its roof and were made with small perforations to allow the water to produce a

fine spray. A-8 haulage-way was sprinkled from the discharge pipe of the pump in A-7.

The natural wet zone commences at a point 160 feet north of A-10, and from here in the Main North Entry is wet and muddy through its entire length of 1,500 feet. The first five hundred feet of A-12, the workings of A-7, and all the "B" entries and their tributary rooms and blinds, with the exception of B-9 and 10, all were wet from natural moisture. The other entries which were not provided with pipe lines were sprinkled by means of water cars.

REOPENING AND RESCUING.

Wm. Kilpatrick, Supt., was walking towards the mine along the tramway which connects the tipple with the mine about 500 feet from its entrance, when he became aware of the disaster by seeing great volumes of flame, smoke and dust issuing with terrific force from the mouth of the Main North, followed by reports of heavy concussions. The entrance to the haulage-way was caved and was nearly filled with disintegrated debris of the out-crop for a distance of 75 feet. The fan was disabled and both entries were filled with afterdamp. In order to secure as much air as possible and hasten results, the fan of the First East mine was cut off from its own workings and connected with those of the Main North; the fan of the latter was then repaired and started at 7:30 p. m., and was made to run forcing instead of exhausting as heretofore, so as to work in conjunction with the other fan. The air began to circulate as far as B-3 and 4. In the meantime, gangs of men were at work building temporary stoppings, clearing debris and rescuing.

By 12 o'clock the night of the explosion a party of men, led by Joe Ball and Robert McAllister, and searching A-7 and 8, found Leonardo Virgen, the only one to survive the explosion, lying in a comatose condition on the double parting of A-8 and closely surrounded by fourteen dead bodies. Virgen was carried to the surface and in the afternoon of the following day was well and walking about the camp. A thorough investigation was then made of A-7 and 8, with the hope of finding more alive, but this proved in vain, as none had remained in their working place.

This office was notified of the explosion by telephone about a quarter of an hour after it occurred. J. D. Griffiths, Deputy Inspector, and myself left on the first available train and reached Primero at 9:10 next morning. Several bodies had already been recovered, which were those of victims caught on their way out, and the three who were killed outside, close to and directly in front of the drift. We entered the mine at 9:40 a. m., and accompanied by Messrs. D. A. Griffiths, superintendent of Bear Gulch mine, and F. Bayles, manager Cokedale mine, and reaching a distance of 2,400 feet we were informed that one group of

rescuers had gone into the A-7 and 8 district, and that others were in the Main, further ahead. We then proceeded along the main entry as far as A-9 and to within about 300 feet of the face of A-9, which was the terminus of the air circuit in that direction, and a further advance was impossible on account of the heavy caves and afterdamp. At that time the Main North was also impenetrable beyond the B-5 cross-cut, a point 80 feet inside of A-9, because of afterdamp. It was at this point that Bert Lloyd, superintendent of the Cokedale mine, owing to over-exertion and the breathing of afterdamp, was overcome. He was immediately carried back to the fresh air, and by the aid of artificial respiration was soon resuscitated. Mr. Griffiths and myself spent the first two days of our investigation in assisting the work of restoring the ventilation and rescuing. At the end of the second day we abandoned all hope of finding anyone alive. The explosion had been so destructive, causing enormous caves and filling every space inward from A-8 with a flood of afterdamp that it was impossible for any human being to have survived in it 48 hours. All that we could hope to accomplish was to recover bodies, and even this proved slow and difficult work, as nearly all the advanced workings which were beyond the limits of the restoration of the air current were filled with either afterdamp or marsh gas. We then turned our attention to finding the cause and initial point of the explosion.

EXTENT AND DIRECTION OF THE FORCES AND DAMAGE TO THE MINE.

With the exception of a large cave at the entrance and a few falls of roof and sides between A-4 and 6, the main north entry was left comparatively intact as far as 300 feet beyond A-10. From this point to the entrance of A-12 there was a continuous fall of roof varying from 2 to 8 feet in thickness. The main air course between these same points was very little disturbed. Both air course and entry from A-12 in had intermittent falls from 50 to 125 feet apart all the way to the face.

The force was outward through both main entry and air course from A-12 to the portal, and nearly all, if not all, the cross-cut stoppings between the two were blown into the latter, and in many instances against its opposite rib, which showed that the force passing through the main haulage-way prevailed over that of the air course, both in power and speed, and was against the incoming fresh air current. The corners of ribs and props left standing in both main and air course were surprisingly free from dust cokings, although I found some, but very little, in both. A trolley pole situated 100 feet outside the mine had a thin layer of dull cokings adhering to the side facing the mine and the wood was slightly singed, which proved conclusively that the flame extended clearly to the outside.

A-7 AND A-8 ENTRIES.

The walls of the overcast (air bridge) situated at the intersection of A-7 and the Main North, were blown towards the direction of their side walls, the east wall into the air course and the west wall into A-7. Both A-7 and 8 furnished abundant evidence to prove, beyond a question of doubt, that the force was inward in these two entries. Rope, wheels and guides as well as the displaced timber of A-8 had been moved inward. The force was greater and the heat much more intense in A-8 than in A-7. The displaced stoppings between these two entries were thrown into A-7.

At the time of the accident the empty rope-trip was about half-way into the rope haulage pass-by of A-8, which is situated 1,400 feet from the mouth of the entry. The trip rider and Jack Elias, boss driver, were both on board of the trip and were killed and their bodies were burned. A short distance beyond where the trip was caught, the entry was heavily caved to within 200 feet of the east end of the pass-by, and from here on to the face, a distance of 1,800 feet, no damage of any consequence was done in A-8. The flame in A-8 terminated at a point 250 feet inside of the pass-by where the wet zone begins in both entries, and there was no coke and not the remotest evidence that any heat had existed beyond in this direction. The first 1,500 feet of A-7 is used only as a return air-way for the district and the product of the entry's inner workings, which is the only part now being worked, is brought through haulage cross-cut, opposite of the old room, No. 35, into A-8 pass-by for the final haul to the surface. The only evidence of heat that I found in A-7 was at the end and a few feet inward from this haulage cross-cut. Four of the fourteen bodies found on A-8 pass-by were burned, the two drivers and two miners who probably were located there when the explosion took place. The other ten died from suffocation, and their bodies, I was informed, did not show signs of having been burnt, which evidence proves that they arrived there and fell sometime after the explosion. From the fact that the flame did not extend further than 300 or 400 feet beyond the point where these victims expired, and that their working places were from 1,400 to 1,800 feet further in, and which were found without the slightest evidence of having been invaded by either force or afterdamp, I believe if these men had remained in some of the working places, or even 700 or 800 feet further in, instead of moving forward, they would have been saved.

A-9 AND A-10 ENTRIES.

The large falls in A-9 and A-10 began about 350 feet from their entrances off the Main North. From here in, while there were a few intermittent spaces of partially clear passage, the roof fall could be classified as almost being continuous to the end of the entries, a distance of 2,700 feet, with heights ranging from 4 to 8 feet. A rope roller frame weighing several

hundred pounds and located in the mouth of A-9 was blown west about 20 feet. Displaced timbers along this entry were also blown in the same direction. Thin layers of cokings were in evidence on the inner side of props. The over-cast at A-10 was completely demolished and the fragments of its west end supporting wall was blown westward into A-10 for some distance. All the above stated indications leave no doubt that the force extended from the main entry inward through both A-9 and A-10.

A-11 AND A-12 ENTRIES.

A-11 had falls from 3 to 7 feet high about 90 per cent. of its entire length. The first five hundred feet of this entry had practically all its displaced timber thrown east, or inward. Bright layers of coke deposits were found adhering to the inner sides of the first blind. The charred timber and the thick cokings on the inner side of props in room No. 6, off second blind, presented unmistakable indications of having passed through intense heat. Four bodies were found in this immediate vicinity and were those of miners who had worked in rooms Nos. 5 and 6. Each was more or less burned. The scattered timber between the face of the second blind and A-11 were driven south, or away from the latter. A canvas on an A-11 entry between third and fourth blinds was blown outward. The fourth blind of A-11 had been worked through and connected with the face of room No. 20 of A-10. A stopping which had been used at this point to keep the ventilation of the two districts separated was blown into A-10 side. From the fourth blind into the face of A-11 some of the dislocated timber leaned in and some out, but the latter direction was sufficiently predominant to show that the general trend of the force was outward, and nearly all the cross-cut stoppings along this distance were forced into A-12. All the rooms working directly off A-11 were the first five turned within the last 300 feet of the face. Although more or less caved, we were able to reach the faces of room No. 1 and room No. 2, and found evidence showing that the occupants had left previous to the explosion. In room No. 2, about 40 feet back from the face and close to the east rib, we found one and a half sticks of "Aetna B" powder and 13 caps of the "3X" Du Pont brand. Rooms Nos. 3, 4 and 5, which had been driven 200 feet, had falls from 125 to 150 feet in length, and from 15 to 20 feet high. These falls commenced at points 30 to 50 feet from the entry and gradually increased in thickness until, at a distance of 75 to 100 feet further in, they reached to the roof above, making further passage to and investigation of the rooms and faces impossible. Before the ventilating current was fully restored I found considerable quantities of firedamp in the caves of these rooms.

Unmistakable evidence of an outward force was present throughout the entire length of A-12. The timber of seven rooms turned north and at the terminus of A-12 were nearly all

thickly coated with coke, some only on the inner, and some on both sides. All of these rooms, with the exception of No. 6, had their timber moved inward, but in No. 6 several large sets had been thrown outward a distance of 10 or 15 feet from their original positions, and the cokings at the entrance of this room were more profuse than in the others. Here the coke was found on both sides, but the thickest coating was on the outer side, and the reason for this exceptional condition will be explained later. From the face of A-12 back for 1,000 feet the caves, with few exceptions, did not exceed on an average of from 4 to 6 feet high and covered from 60 to 70 per cent. of this distance. From here out to where the entry connects with the Main North, the falls of roof reached a height of 12 to 15 feet and was the most ruggedly caved part of any of the cross entries. All the blind entries off A-12 were also badly caved and their tributary rooms showed thick cokings on the props.

From the mouths of A-11 and 12 the explosion traveled north and south through both the main and air course and east into B-7 and 8. This district (B-7 and 8) being wet and perfectly destitute of any elements to supply the explosion, the force which was quite strong at the entrance and due only to the expansive power of the explosion in A-11 and A-12 gradually weakened as it sped east, and it completely died away at a distance of about about 400 feet. The faces of the first and second blinds which were in 190 feet off B-7 were undercut to a depth of from 5 to 6 feet each, with three holes drilled and the powder and fuse already prepared for the shot-firers. These places, only 390 feet from the mouth of A-12 and the Main North, where the force was most terrific, were not the least disturbed. The two men who had worked in this first blind were killed on their way out.

A-13 AND A-14 ENTRIES.

That the force traveled north along the Main from A-12 was made evident by huge timbers thrown several feet in that direction at the intersection of the Main and the haulage passage from B-7 to A-12. The Main North from A-12 to A-13, a part, as before stated, was wet and muddy and consequently there were no cokings nor any other indications of heat to have existed at any point in this locality, yet it is evident from the cokings found in A-13 that the temperature was high enough to transmit the explosion from one district to the other over this wet zone. The disturbed timber in the intervening space between A-12 and the east entrance to A-13 pass-by showed a slight tendency, but not enough for positive assurance, of an inward force. From there in to the face of A-13 (380 feet), which part was heavily caved, the position of the disturbed timber showed that the final movement was outward. A loaded car standing on the Main North between A-13 and A-14 had the bumpers of its north end heaped with slack and small chips of wood, which was conclusive evidence that the force was out-

ward from A-14. There was no one working in A-14 and the only way I have to account for the forces being outward from the faces of these places is as follows:

A-13 and A-14 are in only about 450 feet from the Main North. The chain pillar between the two entries is 80 feet wide. In A-13 is a pass-by 300 feet long which begins about 50 feet from the entrance and ends 100 feet back from the face. This pass-by is driven in the chain pillar and has three cross-cuts connecting with A-14. The explosion traveled from A-12 to the east end of the pass-by in A-13, but the quantities of dust gathered was not enough to destroy all the oxygen in the air. When the explosion reached within close proximity of the face of A-13 it was supplied with increased quantities of dust and probably an atmosphere containing some percentage of firedamp, and aided by both these elements of destruction, the explosion was magnified and it quickly spread backwards from the face to absorb the unconsumed oxygen of its former trail and thus brought about the outward pressure. From the pass-by the explosion went through the cross-cuts to A-14 and thence outward. While I do not believe that the explosion started in this vicinity, yet I must say that had this particular district been a strong generator of firedamp, the conditions would have been very favorable for a gas explosion, as the face of A-13 was 196 feet and A-14 221 feet inside of their last cross-cut, while they should have had at least three cross-cuts within such a space. Such an omission in itself reflects discredit on the mine officials. There was very little damage done to B-9 and B-10. The direction of the force was inward, as the door in the haulage cross-cut between B-9 and the Main North was blown east several feet. The track-layer was killed in B-9. All other employes of B-9 and B-10 are reported to have been out of the mine.

Returning to the face of A-11, the conditions in and around the immediate vicinity of rooms Nos. 4, 5 and 6 were such as to prove conclusively, to my own satisfaction, that room No. 5 of A-11 was the initial point of the explosion.

Room No. 6 was driven south 80 to 100 feet. It struck a fault and was abandoned. Twenty feet back from the face of No. 6 was a cross-cut into No. 5. Directly in line with this cross-cut in the center of No. 6 was a fall of roof from 6 to 8 feet high. On the cross-cut side of this fall was a flattened face rock covered with coke, which could not have been deposited except by a force coming through the cross-cut from No. 5. The sides of this cross-cut, together with several props which stood in line with it, carried heavy clusters of bright coke. There were three cross-cuts through the pillar of No. 5 and No. 4, but only the first two were accessible on account of heavy falls from therein. The ribs of the cross-cuts from No. 5 and No. 4 were thickly plastered with shiny cokings and the mode of their depositing showed plainly that they were driven from No. 5. About 6 feet from the No. 5 side in the first cross-cut was a displaced

timber driven from No. 5 and wedged in tightly between a standing prop and the north rib. On the east rib of room No. 4, directly opposite the cross-cut from No. 5, were quantities of debris and chips deposited in small crevices. The timbers across the entry in front of room No. 5 were displaced; some went in towards the face of the entry, and others appeared to have moved outward. The explosion deviated into all directions from No. 5; the part which passed into room No. 6 had a direct course through the last entry cross-cut into room No. 7 of A-12. The part which traveled back through A-11 blew the stopping of the entry's second cross-cut from the face against the north rib and close to room No. 5 of A-12. This force traveled inward through room No. 5 and passed through cross-cut into No. 6, where it met the force from room No. 7, and the two united and returned through No. 6, which, I believe, accounts for the great number of timbers thrown outward in room No. 6 of A-12 heretofore referred to.

It was reported to me that there were six men working in room No. 5, A-11. After the room had been driven to its full length, three places were turned to the west pillar to win the remaining portion of the coal which was first allotted to room No. 6. The bodies of two of the six men were found at A-7 overcast. The other four are not yet accounted for.

CONCLUSION.

W. S. Musgrove, who attends to the ventilating fan, testified at the coroner's inquest that the fan was running at its usual speed of 152 revolutions per minute up to the time the explosion took place. Had anything happened whereby the air current would have been reduced, or totally cut off from A-11 district, and thus allow firedamp to accumulate in room No. 5 and the other adjacent rooms, the deleterious effect of the gas upon the men would have disabled them physically long before the room would have been half-filled, and such a quantity of gas exploding would not carry the explosion half-way out of A-11 without the aid of dust. Whatever the nature of the ignition, or the chief cause contributing towards the initiation of the explosion, it is clear from the extent of its range, and from the heavy coke deposits found at so widely separated points, that dust was the predominant factor of force. It could have started from a local gas explosion, from the accidental exploding of a quantity of loose powder handled by an employe, by a shot, or by a piece of rock or coal falling and exploding a box of caps situated in close proximity to some powder.

I have stated at some length and in detail the evidence I found subsequent to the explosion, for the purpose of substantiating my conclusion as to the initial point of the explosion, from which it will be observed that the forces radiated in all directions from this point, namely, room No. 5 of A-11.

The principal factor in the explosion was dust, and had it not been for the dust which transmitted the explosion from the starting point throughout the mine, the primary explosion itself would have been simply local and confined to possibly the room where it originated and gone no further. Most of the coals in the southern field carry a very low percentage of moisture and a high percentage of volatile gases, or such gases as are readily distilled from the coal in the presence of heat, and when such gases are ignited, they have all the force and effect of a gas explosion and are carried to all points where there is dust to feed upon.

Oscar Kepheart and John Morris, the two firebosses for the Main North, both reported their respective districts "all clear from gas" the morning of the explosion.

As my report heretofore shows, some portions of the mine produce water in such quantities as to require pumping, and other portions are dry. Robert Morefield, pumpman, who had charge of the sprinkling, testified before the coroner's jury that sprinkling had been done the morning of the accident. But it is apparent, from the evidence which I have already pointed out, that the mine had been permitted to become dry and dusty, and the explosion resulted from a lack of sufficient sprinkling to wet the dust.

For good ventilation the Main North ranks with the best of the large mines in the State, and that the explosion was so powerful and destructive in its path is partly due to the large volume of air in circulation at the time.

Several years ago, considering more safeguards for the protection of the employes against the danger of fire occurring and shutting off the men, also to prevent the waste of ventilation, this Department requested the superintendent then in charge of the Primero mine to have the wooden stoppings in all the cross-cuts between Main North and its air course replaced by stoppings constructed of rock and cement. This was granted, and in addition, stoppings in numerous places between side entries were thus changed. The precaution taken by the company for the protection of the employes as suggested and mutually agreed upon were as follows:

(1) Shot-lighters were employed to do all the charging of holes and blasting to break down the coal, after all the other employes had left the mine.

(2) Shot-lighters to refuse firing shots unless the coal was undercut to a depth exceeding the depth of the holes.

(3) Government permissible powder was used.

(4) All cross-cuts between main entries sealed with stone and cement.

The above measures of safety are not demanded by the statute governing coal mining in this State, although recom-

mendations for these, as well as many other needed improvements in the law, have been made to each Legislature for several years past through the biennial reports issued by this Department.

A list of the deceased will be forthcoming when it is completed. All the bodies have not yet been recovered. Up to date, February 26th, 1910, sixty-eight have been brought out of the mine.

Respectfully submitted,

(Signed) JOHN D. JONES,
State Inspector of Coal Mines.

APPENDIX.

When the miners carry their own powder and caps into a mine, even in small quantities, each place, room or entry where this powder is kept, or used, becomes in itself a factor of danger of sufficient magnitude to initiate an explosion in the presence of inflammable dust and under certain conditions. Therefore, miners should be absolutely forbidden from handling or carrying caps or powder of any kind into the mines. Such work should be assigned to the shot-firers exclusively.

I take this opportunity to show how, through the establishment and enforcing of the rule of shot-firing, a number of lives were saved in this State in the last few months. No better argument can be made for the passage of a shot-firing law:

A general dust explosion, originating from a "blown-out" shot, occurred in the Slope district of the Morley mine, Las Animas county, Nov. 14, 1909. The shot-firer was killed; the employes, numbering 52, were saved. The floor of this mine is wet nearly all over its entire area.

December 14th, 1909, a dust explosion from a "blown-out" shot occurred in the Greenville mine, Las Animas county. Two shot-firers were killed; the other 82 employes were saved.

All shots should be fired by electricity and when all the employes, shot-firers as well, are out of the mine.

TABLE OF PERSONS KILLED—THE PRIMERO MINE.

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
I. C. Cho	Korean	Miner	45	Married	3
Y. B. Kim	Korean	Miner	32	Married	2
K. W. Phun	Korean	Miner	33	Married	4
H. P. Kim	Korean	Miner	36	Married	3
C. Y. Choy	Korean	Miner	33	Married	2
S. K. Lee	Korean	Miner	44	Married	5
O. H. Kim	Korean	Miner	37	Married	3
H. K. Lee	Korean	Miner	29	Married	1
D. R. Yar	Korean	Miner	47	Married	4
Anton Pikado	Austrian	Miner	20	Single	..
Andy Stumpf	Austrian	Miner	23	Single	..
Joe Psear	Austrian	Miner	27	Single	..
Joe Dragovich	Austrian	Miner	30	Single	..
Geo. Malovich	Austrian	Miner	29	Married	3
Anton Malovich	Austrian	Miner	42	Married	3
Anton Surina	Austrian	Miner	26	Single	..
John Slanovic	Austrian	Rope cutter	23	Single	..
Mike Slanovic	Austrian	Oiler	18	Single	..
Anton Berhant	Austrian	Rope rider	21	Single	..
Joe Bibernik	Austrian	Rollerman	25	Married	1
Frank Kert	Austrian	Miner	33	Single	..
Lorenzo Yearic	Austrian	Driver	21	Single	..
Frank Jurgar	Austrian	Miner	24	Single	..
Max Pash or Kis.	Austrian	Miner	22	Single	..
Frank Novack	Austrian	Miner	21	Single	..
John Ambrozic	Austrian	Miner	50	Widower	..
John Soltic	Austrian	Miner	27	Single	..
Mike Soltic	Austrian	Miner	20	Single	..
John Kosernik	Austrian	Tracklayer	28	Married	1
John Leipar	Austrian	Miner	24	Single	..
Frank Oneris	Austrian	Miner	29	Single	..
Louis Lanisek	Austrian	Driver	23	Single	..
Anton Yurisic	Austrian	Driver	29	Single	..
Joe Slavez	Austrian	Miner	40	Married	2
Martin Dabosek	Austrian	Driver	21	Single	..
Tony Sorc	Austrian	Miner	44	Single	..
Albin Logar	Austrian	Miner	36	Widower	..
Bob Kern	Austrian	Miner	46	Single	..

TABLE OF PERSONS KILLED—Concluded.

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
John Iskra	Austrian	Miner	28	Married	..
Jack Iskra	Austrian	Miner	21	Single	..
Joe Hummel	Austrian	Electric helper	18	Single	..
Fred Pikler	Austrian	Miner	40	Married	3
Alex. Lucas	Austrian	Miner	30	Married	..
Jim Valint	Hungarian	Timberman	23	Single	..
Desire Sinon	Hungarian	Timberman	23	Single	..
Albert Toth	Hungarian	Miner	27	Single	..
Steve Boretz	Hungarian	Miner	30	Married	1
Sam Venovich	Croatian	Driver	28	Single	..
Frank Mogdic	Croatian	Miner	26	Single	..
Steve Spularic	Croatian	Miner	25	Single	..
Mat Pirslin	Croatian	Miner	35	Married	..
Martin Pirslin	Croatian	Miner	32	Married	1
Mike Stepanic	Croatian	Miner	28	Single	..
Pete Perko	Pole	Miner	36	Married	..
Jim Polombo	Italian	Driver	31	Married	2
Frank Polombo	Italian	Driver	23	Single	..
Ferman Villareal	Mexican	Miner	32	Married	4
Fidel Arguella	Mexican	Driver	26	Single	..
Apifinio Romero	Mexican	Trapper	16	Single	..
Sam La Croix	Mexican	Trapper	15	Single	..
Jose La Croix	Mexican	Driver	40	Married	6
E. Stravgeld	German	Miner	53	Married	3
Fred Thiess	German	Timberman	40	Married	..
Chas. Sellars	Colored	Driver	36	Married	..
J. H. Anderson	Colored	Miner	45	Married	3
W. E. Field	Colored	Miner	40	Married	2
Speaker Mosley	Colored	Miner	29	Married	1
Frank Dotson	Colored	Miner	48	Single	..
D. J. Williams	Welsh	Mine boss	38	Married	..
Wm. Helm	American	Electrician	25	Single	..
J. W. Hoskin	American	Miner	51	Married	..
Jack Elias	American	Driver	46	Married	..
Reub. Daugherty	American	Driver	38	Married	1
W. H. Pannell	American	Miner	30	Single	..
Jas. Rummings	American	Driver	28	Married	..

THE EXPLOSION AT STARKVILLE.

On October 8, 1910, about 10 p. m., an explosion occurred at the Starkville mine, which caused the death of fifty-six persons, whose names are given below:

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
Thos. Upperdine	American	Triprider	28	Married	2
Francis Goggin	American	Driver	18	Single	..
Luke Upperdine	American	Night boss	50	Married	2
Fred Seppie	American	Motorman	23	Single	..
Wilbert Hedquist	American	Motorman	23	Single	..
Henry London	Colored	Driver	31	Married	..
Savato Gregor	Austrian	Miner	28	Single	..
E. Horvatt	Servian	Miner	31	Married	1
Joe Deromich	Serivan	Miner	20	Single	..
Jan Lkimek	Pole	Miner	23	Single	..
Frank Klimek	Pole	Miner	19	Single	..
Albery Legh	Pole	Miner	25	Married	1
Frank Krawczyk	Pole	Miner	34	Married	4
John Krawczyk	Pole	Miner	25	Single	..
Josef Baronski	Pole	Miner	34	Married	4
Josef Scafranski	Pole	Miner	38	Married	4
Josej Dobranski	Pole	Miner	40	Married	4
Meker Chovenski	Pole	Miner	40	Married	3
Joe Lubranski	Pole	Miner	35	Married	3
John Cysz	Pole	Miner	37	Married	3
Wit Nyzio	Pole	Miner	38	Married	2
Alois Szevczyk	Pole	Miner	37	Married	2
Jon Dylenski	Russian	Driver	21	Single	..
Pete Zimbra	Pole	Miner	36	Married	1
Pete Branka	Pole	Timberman	32	Married	2
Mike Kumorek	Pole	Miner	35	Married	4
Lawrence Kobara	Pole	Miner	50	Married	6
Frank Lukasich	Pole	Miner	27	Single	..
John Mehora	Pole	Miner	50	Married	3
John Tobias	Pole	Miner	31	Married	3
Rudolph Kempany	Pole	Miner	28	Married	2
Rudolf Ptaschek	Pole	Miner	29	Married	3
Frank Ziskowski	Russian	Miner	37	Single	..
Paul Baltusznik	Russian	Miner	40	Single	..
Peter Gut	Pole	Miner	28	Married	2

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
Mike Maday	Pole	Miner	35	Married	1
Anton Lysczarz	Pole	Miner	25	Married	3
Albert Lavuski	Russian	Miner	24	Single	..
Anton Malacarne	Italian	Miner	44	Married	1
Goyo Giacomo	Italian	Miner	34	Married	2
U. Santogrossi	Italian	Miner	19	Single	..
Savino Santogrossi	Italian	Miner	23	Single	..
Anton Malacarne	Italian	Miner	37	Married	2
G. Baldazari	Italian	Miner	25	Married	..
Stefano Mussati	Italian	Miner	24	Married	4
John Faro	Italian	Miner	20	Single	..
Pete Faro	Italian	Miner	24	Single	..
Felix Porcie	Italian	Miner	24	Single	..
Joe Silano	Italian	Miner	24	Single	..
Dominic Tomazino	Italian	Miner	35	Married	2
E. Gallegos	Mexican	Miner	24	Single	..
Carpio Lopez	Mexican	Miner	22	Single	..
Alex Gallegos	Mexican	Miner	19	Single	..
Emilio Maes	Mexican	Miner	24	Single	..
Frank Greer	American	Triprider	22	Single	..
Tom Plutto	Italian	Miner	24	Single	..

The Starkville mine is located on the Atchison, Topeka & Santa Fe Railroad, about five miles south of Trinidad, Las Animas county, and is operated by the Colorado Fuel & Iron Company. The coal is bituminous and of the coking variety. Its chemical analysis is as follows:

Fixed Carbon	Volatile	Moisture	Ash	Sulphur
50.86	30.29	.55	18.30	.74

The coal bed under consideration lies nearly horizontal and varies from five to seven feet in thickness and belongs to the lower series of the Laramie cretaceous formation. The mine was opened through two drifts some twenty-five years ago and in recent years a third drift was opened, advancing almost parallel with the other two drifts. The first two were known as the old mine and the later one as the new mine.

The average output of the mine prior to the disaster was 1,200 tons per day, the largest portion of which was made into coke at the plant near the mine.

The coal is mined by the room and pillar system. The hauling is performed with electric locomotives from partings in different sections of the mine to the surface. The primary haulage, or gathering from the rooms to the inside partings, is done with mules.

Prior to the explosion the mine was ventilated by a 4′x10′ fan of the company's own make, driven by electric power and located at the foot of an air shaft at C-1 entry, about 4,800 feet from the portal of the main haulage drift. Assisting this was a 7-foot Stine fan located at J-6 entry, about 9,000 feet from the portal of the main haulage drift. The system of ventilation was practically one continuous current.

The date of my last inspection of the Starkville mine was July 29th, 1910. At that time I found the mine in a reasonably safe condition. I did not detect any explosive gases and the fire-bosses' reports showed the mine to be perfectly free from firedamp. The ventilation was fair throughout the various parts inspected and there were no accumulations of dust along the roads. The road beds were sprinkled by tanks mounted on trucks and were hauled into the mine with water and while in transit the water was permitted to escape along the road bed.

Air measurements on the date of this inspection were as follows: Stine fan, 39,600 cubic feet per minute, at J-8 intake; 27,440 cubic feet per minute at main return; near C-1 fan, 44,800 cubic feet per minute.

As a factor of safety no powder was allowed to be used in the mine for several years past, and it gave off so little gas that naked lights were used exclusively.

The explosion started at a point about 800 feet from the portal of the old mine on the main haulage road, and was caused by the derailment of loaded cars displacing some timber and thus relieving and setting in motion a shower of fine dust that had from time to time accumulated upon the timber and lagging above. The main haulage road, where the explosion started, is equipped with two tracks having a grade from 1½ to 2 per cent. in favor of the loads. A loaded trip consisting of 31 cars was found about 800 feet from the mouth of the mine. This trip had broken in two while on its way out. Attached to the motor were ten cars, all standing on the track intact, with the motor forced against fallen debris of rock and timber on the outward side. The front end of the second section, consisting of twenty-one cars, and which had broken away, was seventy feet further in; the two front cars were off the track and had been forced against the left side and thus knocked out three sets of timber, as stated above. When the trip broke in two, no doubt the two sections became separated for some distance and, as usual, the nipper, under such conditions, would signal the motorman to keep ahead so the cars could again come together gradually and thus avoid a crushing compact. Being on a grade, it is natural to believe the cars were traveling at a high rate of speed, and in the meantime the first two cars of the hind section became derailed, thus releasing the timber and precipitating the dust into the atmosphere. The displaced timber from which the electric trolley wire was suspended caused the wire to sag and come

into contact with the iron bar of the cars, creating a short-circuit and forming an arc, the flame or flash of which ignited the dust that was floating in the air.

The explosion from its point of origin could be easily traced to its terminations by the scattered timber and other material, also by the location of coke deposits and by the scouring of the ribs and coal slips along the entry. The course of the forces of the explosion, as indicated by the strewn timber and debris, shows that from the derailed section of loaded cars, one section of the flame traversed the main road to the surface. Another force started inward along the main haulage road to C-1 fan, wrecking it, and upon passing 3 and 4-S entry it stopped near C-1 parting, this section being wet and on the return air of the mine. It turned to the right at the 3 and 4-S entries and continued along said entries to the new mine haulage road, following it to 8-south entry, and passed through the Stine fan, wrecking it and displacing the motor. It then turned to the right and continued up to J-7 and 8 entries, where the first eleven bodies were found, then going left along 8-south entry and stopped for want of fuel upon getting into the H-entries.

Immediately after the explosion, word was sent throughout the State of the disaster; the Colorado Fuel & Iron Company summoned all the superintendents of its various mines to hasten to the rescue of the men entombed. Chief Inspector J. D. Jones and his two assistants responded to the call as soon as notified.

As soon as the ventilating current was re-established by installing a 7-foot Stine fan at the entrance of the air course to the new mine, a conference was held by the officials of the company and the State Inspectors, and the result was that the force present was divided into three parties or shifts, and each was accompanied by three or more helmet men. The work of recovering the bodies of the men was slow and hazardous, owing to the workings being filled with the deadly afterdamp. Too much praise cannot be given to the men who so diligently carried on the work to recover bodies.

In J-7 eleven bodies were recovered in the rooms and it was shown plainly that they were burned by the intense heat and killed outright. These rooms showed thick deposits of coke on timber and cars. With the exception of two, all of those found in the H-1½ and 9-south died from suffocation, due to afterdamp, also all of the men working in the K-entries. Nearly all those found in the K-entries walked back to the Cabin parting, a distance of about 1,000 feet from their working places. The timber supporting the main entry stood intact the entire length of the said loaded trip, but the entry was completely demolished from there inward and outward, showing plainly that the point where the explosion originated acted as a cushion for the forces going in the different directions.

It was purely a dust explosion and without any assistance, as far as I am able to determine, from firedamp. The initial point being about 800 feet from the mouth of the mine indicates that it started at least one and a half miles from the nearest working place. This disaster probably could have been avoided if the timber and sides of the haulage roads had been kept free from dust accumulations, and it is an absolute proof that the mere sprinkling of the road beds will not suffice.

(Signed) FRANK N. OBERDING,
Deputy State Coal Mine Inspector.

Denver, Colo., Feb. 21, 1911.

HON. JOHN F. SHAFROTH,
Governor of Colorado,
Denver.

Dear Sir—Herewith I beg leave to submit to you my report on the Delagua explosion, which occurred November 8, 1910, and which resulted in the death of seventy-nine persons. I regret exceedingly the long delay in transmitting this report to you, but I have been hard pressed with work connected with my new duties since my resignation from the office of State Coal Mine Inspector, and hope you will accept my apology for this remissness.

The Delagua mines are situated near the bottom of a canyon whose undulating sides rise irregularly to heights varying from 300 to 400 feet from the base, about six miles west of the Ludlow station of the Colorado & Southern railroad, and about twenty miles north of the town of Trinidad, in Las Animas county. They are owned and operated by the Victor-American Fuel Company, whose own railroad, of six miles extent, the Colorado & Southwestern, connects the plant with the main line of the Colorado & Southern railroad. The mine consists of five independent openings, viz.: Four drifts and one slope, two on the south side and three on the north side of the canyon. The plant was originally equipped with a tipple trestle 400 feet in length, extending from one side of the canyon to the other on a level plane with the main openings, and was fitted with two of the most up-to-date tipples and modern appliances know to science, to receive the large output as it was brought from the mine. On the night of October 5, this entire trestle, tipples, the adjoining coal washeries and power plant were totally destroyed by fire, which was reported to be of an incendiary origin. Hence, at the time of the explosion, the product was handled over a temporarily constructed old-fashioned single tipple on the north side, which curtailed the output to less than one-half of its usual daily capacity. Due to the fact that there were no tipple connections, the two mines on the south side did not resume operations, and consequently a part of the men from the south side workings were transferred to mine No. 3, increasing the force, and thereby the death rate was larger than it would have been if Nos. 1 and 2 mines had been working.

The Delagua coal bed is a member of the upper of the three series of veins characterizing the Raton Field, and it varies from 5½ to 7 feet in thickness. The coal is bituminous in character and of the coking variety.

ANALYSIS OF THE COAL.

Fixed Carbon.	Volatile Matter.	Moisture.	Ash.
53.25	36.17	1.89	8.69

The mine where the explosion occurred is known as No. 3. It is opened by a slope entering upon the outcrop of the coal and driven on the dip of the vein. Practically all the workings of the mine are embraced within the territory tributary to the third and fourth north entries. These two entries, with their parallel air courses, branch off the slope at distances of 700 and 1,400 feet, respectively, from the entrance, and have reached a distance of 8,500 and 7,100 feet northward, in the order given. The cross-entries, or those from which the rooms are turned, are driven eastward in pairs from 400 to 800 feet apart, and are continued until the workings of the fourth north connects with the air course of the third. In this same manner the cross-entries of the third unite with the second north, and it was thus that those men from the inner workings of the fourth north, who were located beyond the destructive limits of the force of the explosion, escaped through mine No. 2, a separate opening to which the second north entry belongs. The entire workings of the mine are conducted exclusively under the double entry, room and pillar system. The live workings of the mine at the time of the explosion were confined within the areas inward, from the twentieth cross-entry in the third, and from the thirteenth east cross-entry in the fourth north and the three pairs of west entries off the latter. From these points outward all of the east entries and their tributary rooms had been worked out and abandoned.

The ventilation was created by a 14-foot Capell exhaust fan, passing 96,960 cubic feet per minute. Part of the air current entered along the slope and was divided about equally into two splits—one for the third, and the other along the fourth north. The other portion of the air entered through mine No. 2, and from there traveled into the third, and there joined the other currents near the face of the workings, from whence all returned in one volume through the main air course of the fourth, ventilating the west workings on its outward passage into the fan. The main haulage was done by electric locomotives; 250 volts were used all through.

It was about 2 o'clock in the afternoon, when Superintendent Lewis, who was at the time standing on the tipple trestle, noticed volumes of smoke issuing from the fan house, which is situated at the mouth of the air course, about 300 feet west of the entrance to the slope. Immediately after his discovery, he entered the mine through the main slope for the purpose of locating the point where the smoke came from. While proceeding along the fourth north entry, at a point about 1,200 feet from the slope, he found that the door and ribs in a diagonal cross-cut through the pillar between the main entry and air course were on fire. The flames had already gained such headway that Lewis thought it useless to try to extinguish the fire without water power. He then instructed a motorman, who happened to be coming out at the time, to disconnect his motor

from the trip of cars and continue to the surface with all possible speed and notify William Kilpatrick, outside foreman, and James Young, master mechanic, to bring into the mine all the hose that was available. Lewis' intention was to attach sufficient hose to the pump's column pipe on the slope to reach the seat of the fire. This was the last seen of Lewis alive. The motorman delivered his message. and Young and Kilpatrick entered the mine with some of the ordered equipments, without losing any time, and when they were some distance down the slope the explosion occurred, killing the two men and all others who were within the bounds of its life-destroying force.

Lewis' body was found on the slope a short distance below where Young and Kilpatrick had fallen. Lewis evidently, after instructing the motorman, followed, with the intention, it is believed, to assist the men to bring in the hose and also, probably, to slow the fan and thus reduce the air fuel for the flames. It was about 2:30 p. m., or half an hour after the smoke was first discovered at the fan house, that the explosion occurred. The cross-cut where the fire started, and which was the point of origin of the explosion, was once intended for a haulage way, and this was why the door had been placed there. Directly opposite the cross-cut, on the main air course, is a double parting 200 feet long, to accommodate the cars hauled by mules from the first and second, third and fourth west entries. These two pairs of west entries are turned at nearly right angles off the main return air course, and had been driven to distances of 1,000 and 1,200 feet, respectively, with rooms branching north and south off both pairs. The first and second west are located 400 feet outside of where the fire started, and on the main return between the two entries was a door to turn the air into the second and out the first; consequently, the smoke fumes from the fire were carried directly upon the thirty-three men that worked in this particular district and killed them. Three of this group of men were found on the main air course, between the seat of the fire and the entrance into the second west. They were lying on the floor, with faces downward, and were more or less burned. Three others were located at intervals of twenty-five and thirty feet apart in the first west, immediately inside of the entrance. The other twenty-seven men were found in two groups of eighteen and nine each, near the bottom of the first west, and at the end of the last cross-cut between the two entries. They were lying side by side, excepting the three near the center of the largest group, who were leaning upon one another. None of the bodies showed the slightest indication of burns or injuries from any heat or force. These victims had congregated at this point in an effort to escape the fumes as far as possible, and when the atmosphere became so heavily contaminated from the gases of the fire as to be no longer breathable, they died from suffocation, which no

doubt occurred long before the explosion. The other six men from this district referred to above also died from suffocation while trying to escape through the smoke.

The third and fourth west entries are situated about 100 feet inside of where the fire started, and, therefore, the smoke could not reach the men in this district as long as the ventilating system was intact, as they were situated in advance of the fire in the air circuit. However, after the collapsing of the door in the burning cross-cut, and in this way the air becoming short-circuited, more or less of the fire fumes would naturally penetrate the third and fourth west. At the lower extreme end of the fourth west, a pair of entries had been turned to the north, known as the "fifth north," and were in about 300 feet. The four miners employed in these two entries were rescued alive, about 9:30 p. m. on the same day of the explosion, by the helmet corps, consisting of Willis Evans, Bert Lloyd, J. Walker and Al Thompson, which entered a few hours after the explosion, and before the fire was completely subdued. The face of the fifth north entry was in about 25 feet beyond the last cross-cut. The four men rescued had put a canvas across the entry a few feet beyond the last cross-cut as a barricade against the deadly fumes which were gradually advancing towards them from the fire, thus to keep the amount of air there was beyond the canvas uncontaminated as long as possible. Of all the canvases put up to conduct the air currents underground, none were more hermetically fitted than this one. The bottom was covered with fine slack from one side to the other, and all sides and top were perfectly tight. During their incarceration they made several visits, one at a time, back along the fourth west entry, as far as they could safely go, to determine the atmospheric condition, and each time found that the smoke was too thick to venture an attempt to escape through it. One of the party had made more visits to this entry than the others, and was found to be much weaker than his three companions when discovered. The joy and enthusiasm of the entombed men upon the arrival of the rescuers is beyond description. From the face of the fifth north to the nearest point on the main entry, outside of the fire, where fresh air was then circulating, and where a force of rescuers without helmets were waiting, is about 1,350 feet. Before starting out with the rescued, Willis Evans took off his helmet and placed it on the weakest of the four men rescued. After walking back some distance, he (Evans) told his three comrades that he would not proceed, but remain and search a few of the rooms of the fourth west, and for them, after safely delivering the rescued men, to return for him. A longer time than Evans anticipated elapsed before the party returned. A fresh helmet corps, consisting of Bert Manley, John Harrison and H. Sanderson, started out, and when they found Evans, he was fast asleep by the side of the roadway in room 4. He was immediately removed and carried outside, but he never recovered consciousness, and died in a few

hours after. Willis Evans was an employe of the Colorado Fuel and Iron Company's engineering corps, and was a volunteer aid at the Delagua catastrophe. He was 25 years of age, and a graduate of the Colorado School of Mines. He bore an excellent character, and was of a noble, generous disposition. He was exceedingly bright and physically strong. At the Starkville explosion, which occurred thirty days previous to the one now under consideration, he was one of the most heroic of the rescuers.

THE STARTING OF THE FIRE.

How the fire, which was the initiatory cause of the explosion, started, no one knows positively. But, from the statement made to me by Frank Levick, I am much inclined to the belief that it was accidentally started by the lamp of one of the two colored drivers, James Sampson and L. Smith, of the fourth west. Frank Levick and his partner, P. E. Smutzler, were working in room No. 6, off the fourth west. About 12:50 in the afternoon, Smutzler went back to look for cars, and when he arrived at the double parting, he found the two drivers eating lunch in the cross-cut. After being informed that the cars would soon be coming, he returned to his room. About 1:30 o'clock, one of the drivers rushed into the room of Levick, and Smutzler and asked if they had any water left in their buckets, and stated that the cross-cut at the double parting was on fire. Both Levick and Smutzler went back to investigate matters, and they found that the fire was rapidly spreading towards the main air course, and the double parting, the usual way out, was impassable from heat and smoke. They then secured an ax and cut their way through a cross-cut inside of the fire into the main entry. They proceeded inward along the fourth north, through the sixteenth cross-entry into the third north, and from there into the second north, and while on their outward course through the second, the explosion occurred. They felt its concussion, but it was very slight. The said two colored drivers, and all the miners of the third and fourth west, excepting the two above described, and the four rescued, were killed along the fourth north entry and air course while traveling inward in their efforts to reach No. 2 outlet.

The mine was worked with naked lights exclusively. It is possible that after eating their lunch, one of the said drivers changed the wick in his lamp before leaving the cross-cut, and in disposing of the old wick, he probably threw it carelessly amongst some easily inflammable material lying close to the door or one of the ribs, and thus starting the fire. It is known from Frank Levick's statement that it was upon the driver's return from his first trip after lunch that he discovered the fire. It must have gained with great rapidity, as by the time of the explosion it had reached, as was indicated by the coked ribs, 125 feet south and about 40 feet north along both sides of the double parting, besides the twenty feet it had to travel

through the cross-cut. From the time P. E. Smutzler, Levick's partner, visited the two drivers, at 12:50 o'clock, until the explosion occurred, one hour and forty minutes had elapsed. If the fire started in the door, it appears to me that it would have been burned through and collapsed long before the explosion. The collapsing of the door was the most propitious moment for the explosion during the period of the fire. While the door was intact, the supply of air inside, this being the return for the air current, was more or less impregnated with carbonic acid gas, and thus rendered unable to form a complete combustion. The result was, that large volumes of carbon monoxide (CO) was formed, which is highly explosive when properly mixed with air. I am of the opinion that the fire started in the timber or coal some distance inside of the door, and when it reached and destroyed the door, the entire current of fresh air from the main entry passed into the immense body of carbon monoxide gas and formed an explosive mixture, and the explosion quickly ensued. The destructive force of the explosion was confined to parts as follows: The full length of the slope from the fourth north out. The first 1,500 feet of the third north, from the mouth of the fourth north to a point half way between the twelfth and thirteenth cross-entries, a distance of 5,000 feet. I found but very little dust cokings along any of the parts traversed by the force. But the fact that some of the men who were standing outside, about 100 feet from and in line of the slope, were burned, and that such violent force extended into the fourth and third, distances of 1,000, 1,500 and 3,800 feet, respectively, from the nearest body of the said explosive mixture, strongly indicates that dust took part in augmenting and propagating the explosion.

During the time of my investigation, on November 9 and 10, I could not determine the hygrostatic condition of the slope, as its roof had fallen to a height varying from two inches to six feet, covering the floor the entire length of 1,400 feet. Parts of the third north were dry and parts wet, with light accumulations of dust at widely interspersed points on the upper side of the roadway. The fourth north was dry, but free from dust accumulations. The force of the explosion did not invade even one of the entries where the miners were working. They were all moist and free from dust. I was accompanied through the mine by Deputy Inspectors James Dalrymple and Frank N. Oberding. During our examination of even the most advanced workings, and this before the air current was fully restored, we failed to find the slightest trace of firedamp.

Mr. William Lewis, superintendent of the Delagua mine, who was a victim of the explosion, was a competent and thoroughly posted coal mining man; he was a good student, and was both practically and theoretically a first-class coal miner. He was deputy state coal mine inspector in this State for a short time, and resigned to accept a better position. In the

performance of his official duties, his chief aim was to first protect and safeguard life and property. He was respected and admired by all who knew him, and his death is keenly regretted by his numerous friends.

Following is a table containing the names of the persons killed.

Respectfully submitted,

JOHN D. JONES.

Name of Person.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
William Lewis	American	Superintendent	..	Single	
W. J. Evans	American	Ass't. Superintendent	24	Married	Two
Llewlyn Evans	American	Pit Boss	41	Married	Three
James G. Young	American	Master Mechanic	46	Married	Three
W. C. Kilpatrick	American	Outside Foreman	42	Single	
Till Woodward	American	Electrician	25	Single	
Frank Smith	American	Pumper	31	Married	None
James Bennett	American	Motorman	19	Single	
E. J. Byrd Jennings	American	Motorman	17	Single	
Dave Bell	American	Motorman	22	Single	
Jerry Davis	American	Nipper	16	Single	
James Daugherty	American	Driver	24	Single	
Willis Evans	American	Rescue Man	25	Single	
L. Smith	Colored	Driver	22	Married	None
James Sampson	Colored	Driver	36	Married	One
A. Saw	Japanese	Miner	28	Single	
M. Nakamichi	Japanese	Miner	33	Single	
K. Ogami	Japanese	Miner	30	Single	
S. Asaida (Ishida)	Japanese	Miner	34	Married	One
S. Espinosa	Mexican	Miner	30	Married	None
R. Bedalla	Mexican	Miner	18	Single	
Veianda Perea or Perex	Mexican	Miner	45	Married	None
Jose Bedalla	Mexican	Miner	16	Single	

Name of Person.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
Jesus Mariana	Mexican	Miner	28	Single	
Jose Sintera or Cintera or Sintoro	Mexican	Miner	28	Married	None
E. Espinosa	Mexican	Miner	40	Married	Six
R. Bittagomez	Mexican	Miner	27	Married	None
Eph. Mirales	Mexican	Miner	25	Married	
E. Rosilios	Mexican	Miner	30	Married	
Jose Ybarra	Mexican	Miner	30	Married	
Ramon Avalos	Mexican	Miner	40	Married	
Viconti Towas	Mexican	Miner	28	.....	
Jose Angiona	Mexican	Miner	35	.....	
Joe Valdez or Placita Valdez	Mexican	Driver	34	Married	Two
P. Luna	Mexican	Miner	25	Widower	One
F. Teronia	Mexican	Miner	24	Married	None
Jose Leon	Mexican	Miner	27	Married	
M. Leon	Mexican	Miner	32	Married	
Basallio Zabala	Mexican	Miner	25	Single	
Abunda Zabala	Mexican	Miner	28	Married	
V. Lopez	Mexican	Miner	30	Single	
Estaven Lopez	Mexican	Miner	23	Married	
Juan Lopez	Mexican	Miner	25	Married	
Ignacio Lopez	Mexican	Miner	50	Married	
Louis Saballo	Mexican	Miner	20	Single	
M. Cabilla	Mexican	Miner	28	Married	

Ysa Espinosa	Mexican	Miner	31	Married	
F. Roriguez	Mexican	Miner	32	Married	
A. Roriguez	Mexican	Miner	27	Married	
M. Bedalla	Mexican	Miner	40	Married	Big Family
John Castagna	Italian	Tracklayer	42	Married	Two
Joe Dela	Italian	Nipper	16	Single	
Orazio De Santos	Italian	Miner	44	Married	Four
Raffael De Santos	Italian	Miner	45	Married	Four
Camilla De Santos	Italian	Miner	44	Married	Two
Giovani Leonardi	Italian	Miner	31	Married	One
Dominick Murzia	Italian	Miner	45	Married	One
Felice Duronos	Italian	Miner	45	Married	Two
Annabille Castagna	Italian	Miner	26	Married	Two
Guiseppi Sassona	Italian	Miner	25	Single	
Carlo Ecarde	Italian	Miner	26	Married	
Joe Acuto	Mexican	Tracklayer	33	Married	One
Martin Sviaciro	Italian	Bartender	33	Single	
Marco or Mike Fasinich	Austrian	Miner	..	Single	
Dominick Fasinich	Austrian	Miner	..	Married	Three
Giovani Dalipicoli	Austrian	Miner	28	Single	
Nick Dukovitch	Austrian	Miner	38	Married	Four
Paul Sikulic	Austrian	Miner	26	Single	
Anton Sarson	Austrian	Miner	33	Married	Three
Andy Glazar	Austrian	Miner	28	Single	

Name of Person.	Nativity.	Occupation.	Age.	Single or Married.	Number of Children.
Matt Jardos	Austrian	Miner	30	Married	Four
Frank Lenarsic	Austrian	Miner	31	Single	
Milan Gioranvich	Montenegrin	Miner	27	Married	One
Eli Gioranvich	Montenegrin	Miner	27	Single	
Blazo Bosovich or Bosnik	Montenegrin	Miner	26	Single	
(J) Lale Medjodovich	Montenegrin	Miner	47	Married	
Nick Vorotovich	Montenegrin	Miner	29	Single	
Mike Terich	Montenegrin	Miner	..	.....	
Nick Terich	Montenegrin	Miner	..	.....	

REPORT ON THE LEYDEN MINE FIRE.

In compliance with section eight of the coal mining law and at the request of the Leyden Coal Company, I went to the Leyden mine, where a fire had started at 8:15 p. m., Dec. 14th, 1910. The head frame of No. 2 shaft, the boiler and engine house were already burned down when I arrived there at 2 a. m. the following morning. I was informed by the mine officials that there were ten men entombed in the mine. Volumes of smoke and fumes were issuing from No. 1 shaft and the ventilating fan was not running. After due consideration of the best method of procedure to rescue the men in the mine, the fan was started as a force fan; heretofore the same had been used as a suction fan. By this reversal of the fan and depending upon No. 2 shaft for the upcast, we expected to be able to enter the mine No. 1 shaft. Apparently, we were making good progress when a large cave took place in No. 2 shaft, which sent the flames into the air for a distance of seventy-five feet and deprived us of a return for the ventilating current. We then were compelled to take some other plan of action. No. 1 shaft having a double compartment, only a little work was necessary to make the partition complete. When this was done and the fan again reversed, thereby making No. 1 shaft the down as well as the upcast. At the expiration of three hours, I decided that it would be suicidal to allow anyone to enter the mine and this was borne out by the helmet men when they entered six hours later, by their safety lamps going out seventy-five feet from the bottom of the shaft. The reduction of the area by partitioning off the shaft, together with the underground workings being filled with gases which are heavier than the air, placed a heavy burden on the fan, consequently progress was very slow. However, on the night of the 16th the helmet men reached the main south air course and the following day the bodies of Eli Devey, Frank Cskatti, Lester Jones and George Supanchis were found at B-entry of the fifth southwest, and on the 18th the body of John Augustin was found on the second southwest, eighty feet from G-entry. On the 21st the bodies of Louis Zuber, Frank Gotira and Nic Miliksich were found at room No. 9, second southwest. Not finding the Merrick brothers in the south side and knowing that they had been working in this part of the mine, it was thought that they had entered the north side through B-entry of the first southwest, which connects the north and south side workings. The north side was then explored, taking up several days, but the missing bodies were not found. Hence the south side was again examined, with the result that the bodies were found on the 29th in room No. 3, off L-entry of the first southwest.

The cause of the fire is unknown to me. From statements of mine foreman William Laurie and others, who entered the mine to extinguish the fire, it is evident that it started in the south motor room, which is located about seventy-five feet south from the bottom of shaft No. 2. On account of the caved-in condition at this point it is not accessible at the present time to ascertain further facts.

Deputy Inspector Oberding arrived at Leyden 10 a. m. of December 15th and Deputy Inspector Douthwaite at noon of the 19th. Urgent business calling me to the office, and knowing that my deputies were capable of rendering all necessary assistance possible under the existing conditions, I returned to Denver on the day of Mr. Douthwaite's arrival. However, I went to Leyden several nights to find out what progress was being made and to further render what assistance I could.

It is my opinion that none of the victims lived any length of time after being overtaken by the smoke and fumes of the fire. This is indicated by the fact that the drink and food in the dinner buckets were apparently untouched.

In conclusion, I wish to state that in order to minimize mine accidents to the greatest possible extent, it is absolutely necessary to put the inexperienced men under the supervision of the experienced miners. Also prohibit in all coal mines the use of naked lights and the carrying in of matches.

I also take this opportunity to express my approval of the helmet men of the United States Bureau of Mines Rescue Car Service, who rendered the most valuable assistance in the work of rescue at the Leyden disaster. I recommend that every mine have its own supply of helmets and train a corps of men in the use of them. It would have been impossible to have entered the Leyden mine for many days without the aid of the helmet, the air being so thoroughly charged with deadly gases that nobody could breathe it and live. Preliminary repairs had to be made to clear the workings to some extent of these gases before it was possible to begin the work of rescue. The helmet men form the advance guard and reconnoitre the territory to be entered and partly restore conditions so that the work of shutting off a fire or rescuing can be performed by other men not having the heavy impediment of a helmet to contend with.

TABLE OF PERSONS KILLED.

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
Lester Jones	American	Driver	25	Widower	2
George Supanchis	Austrian	Timberman	40	Married	7
Eli Devey	American	Miner	35	Married	1
Louis Zuber	Austrian	Miner	28	Single	..
Frank Gotira	Italian	Miner	26	Single	..
Nic Miliksich	Austrian	Miner	30	Single	..

TABLE OF PERSONS KILLED—Concluded.

Name.	Nationality.	Occupation.	Age.	Single or Married.	Number of Children.
Frank Cskatti	Bohemian	Timberman	40	Married	4
John Augustine	Austrian	Night foreman	55	Married	..
Louis Merrick	American	Machine runner	31	Married	3
Frank Merrick	American	Machine runner	25	Single	..

JAMES DALRYMPLE,
State Inspector of Coal Mines.

REPORT ON THE FREMONT MINE FIRE.

On November 22, 1910, a fire started in the Fremont mine, causing the death of two men by suffocation, whose names were John Palmeri, thirty-five years of age and married; the other, Charles Palmeri, nineteen years of age and single; both were natives of Italy and were employed as miners in the mine.

The Fremont mine is operated by the Colorado Fuel & Iron Co., and is located about four miles southwest of Florence, on a branch of the A., T. & S. F. R. R., and is in charge of Mr. David Griffiths, local superintendent.

The fire originated in the underground mule stable, situated about 1,800 feet from the hoisting shaft on the main slope in what is termed the first north, off main slope. This entry was abandoned as a haulage road, but was connected with the main air course, which runs parallel with the slope about 500 feet to the north. The air course to the north of the mule stable was the in-bye and the main slope was the out-bye for the air current.

The system of mining is long-wall advancing. The stable was situated in an ideal spot, being connected at both ends with the in-bye and out-bye air. Hence it made no difference whether the fan was forcing or exhausting, it would at all times take the fumes away from the inner workings, and in the case of this fire the location proved to be of great value; the smoke and fumes were carried away from the face of the workings.

The driver, Tom Embleton, stated that he was undoubtedly the last person in the barn at about 3:10 p. m. He did not notice any fire at that time. He left the barn and went down the slope and returned twenty minutes later, leaving again to go farther into the mine. About 4 p. m. he received word from the trapper, John Accomanda, that the barn was on fire; he hastened there and found the report true. Every effort was made to extinguish it, but to no avail; the fire had gained too much headway upon the timber and hay in the mangers. In the meantime messengers were dispatched to notify all the men to retreat to the air shaft by way of the air course, and that no one should attempt to go up the slope.

At the time of the fire about 160 men were in the mine, and all were rescued but the two men mentioned above. They, too, followed the road all the other men took until they arrived within about 600 feet of the air shaft, where there is a door leading to the main slope. The two Palmeri broke ranks and approached the door and removed a point rail which was placed against it for a brace, and they deliberately went up the slope, the other men warning them of the danger.

The men were taken to the surface up the air shaft in a bucket connected with a hoist at the surface. A number of men

crossed to the west side of the hoisting shaft and were taken up on the cage with considerable difficulty owing to the smoke going up from there.

That more lives were not lost is due to the good management of the local mine officials and intelligence of a majority of the miners employed.

The government mine rescue car in charge of Prof. Roberts, and the rescue car of the Colorado Fuel & Iron Co. arrived in due time. Protected with oxygen helmets, the trained men made their way into the mine, and with great difficulty extinguished the fire. The helmet men found the bodies of the Palmeris, one seventy-five and the other one hundred feet up the slope.

The cause of the fire has not been ascertained. It may have been started by careless handling of an open light, or by dropping a cigarette in the hay.

In my opinion the Palmeris lost their lives by disobeying instructions. If they had not deserted the men they were with they would have been saved with the rest.

FRANK N. OBERDING,
Deputy State Coal Mine Inspector.

IMPROVEMENTS MADE IN AND ABOUT THE MINES DURING 1909 AND 1910.

BOULDER COUNTY.

Standard Mine. Installed pipes, water and hose for fire line operated by a steam pump. Added several new pit cars.

Monarch No. 2 Mine. Installed a new boiler and hoisting engine.

DELTA COUNTY.

King Mine. Stone and lime stoppings, pipe lines, pump, erected a 30,000-gallon tank, pump, hoisting engine, two boilers and engine.

Cedaredge Mine. Bins and loading chutes, an air course of 25-foot area.

Farmer Mine. Put in 200-foot air tunnel.

EL PASO COUNTY.

Danville Mine. A new air course and boiler house.

Pikeview Mine. Installed a steel fan, modern tipple, generator, 60 roller-bearing pit cars, one pump, one mining machine, road motor, electric hoist and self-dumping cages, two 10-ton scales, shaker screen and new air course.

Austin Bluffs Mine. New tipple and machinery.

Patterson Mine. One 160 H. P. boiler, one Rand compressor and one Sullivan puncher.

FREMONT COUNTY.

Colorado Central Mine. Sank an air shaft, fitted three compartments in main shaft and erected an aerial tram.

Coal Creek Mine. Installed a telephone system.

Rockvale Mine. Installed a Stine fan, two new scales, two electric pumps and telephone system.

Fremont Mine. Telephone system, fifty new pit cars and a new mule barn.

Chandler Mine. Built boarding house and company house.

Radiant Mine. Made new opening, additional tram to connect with tram at head of old tipple.

GARFIELD COUNTY.

South Canon Mine. Opened new upper lift into the East Wheeler vein and constructed about 1,500 feet of track to handle output from this point. Installed one Heine boiler and power equipments. One 15-ton electric motor, etc. Erected a new ma-

chine shop, a new electrical and motor house, laid new tracks in mine yard, made an addition to tipple, new bunker and shaker.

GUNNISON COUNTY.

Bulkley Mine. Constructed new head frame, fan house and installed new scales.

Somerset Mine. Installed a new ventilating fan and built ten cottages for employes, seventy mine cars, one box-car loader, three new 125 H. P. boilers and one 50,000-gallon water tank.

HUERFANO COUNTY.

Big Four Mine. Installed a compressor, 6 H. P. gasoline engine, triplex pump, hoisting engine 20x36 first motion, two 150 H. P. boilers, erected six new houses and 15½x33x7½-foot concrete reservoir and two and a half miles of pipe line to supply the camp and boilers with water.

Black Canon Mine. Installed new boiler and engine.

Sunnyside Mine. Electric installation, new power house, one 6-ton electric motor, one Sullivan machine, fifty pit cars, one track scale and addition to machine shop, erected houses and store.

Rouse Mine. Installed telephone system, rebuilt tipple, track scales, haulage engine, fifty pit cars, one 600-gallon centrifugal pump and power line, pump motor, screen, engine, generator, switch board, one 14 K. W. exciter for power house.

Hezron Mine. Changing from steam to electric power, including power line from Rouse, one electric pump, power line to Ideal mine and one blacksmith shop.

Pictou Mine. Six Sullivan coal punchers, power line from Walsen, and coal conveyor and bin, two D. C. S. drum hoists, compressor, fifty pit cars, two boilers, one 100-gallon pump, steam separator, two small centrifugal pumps, nut coal washery and one air compressor.

Walsen Mine. Addition to power plant, one Temple-Ingersoll drill, new tipple and hoisting engine.

Robinson Mine. Installed telephone system, one mining machine, one 100-gallon pump, new fan, new tipple, one 10-ton electric locomotive, one electric hoist and two Sullivan machines.

Ideal Mine. Installed fan, motor, 32-stall mule barn, water system for camp, new blacksmith shop, company buildings, warehouse and office.

Cameron Mine. One mining machine and one electric hoist.

Globe Mine. Two 125-H. P. return tubular high-pressure boilers, one pair of 10″x32″ first motion Ottumwa hoisting engines, one tandem shaker screen for four grades of coal, one pair of Irvin Brownell engines for running shaker screens, tipple equipment with self-dumping cages.

Midway Mine. One set 50-foot railroad scales, other set remodeled, ten cement tenant houses, one cement fireproof power house, one concrete boiler house, water system for camp, one 150-H. P. boiler, one Sullivan compressor and six Sullivan puncher machines.

Maitland Mine. Screens and other machinery.

Ravenwood Mine. Twenty three and four-room tenant houses, company buildings, water system, tipple and screens.

Beacon Mine. Eight tenant houses.

Pryor Mine. Installed an electric plant (current from Colorado Railway Light and Power Company), one 75-H. P. electric hoist, electric motor for fan, two Sullivan mining machines, one 115-H. P. motor, generator set, warehouse and nut picking conveyor.

Rockland Mine. Installed four boilers, one 18x36-inch first-motion hoisting engine, compound condensing pump, 600 gallons' capacity, cages, shaker, screens, pit cars, etc.

JEFFERSON COUNTY.

Leyden Mine. New fan, 12 feet by 6 feet, with concrete housing.

LAS ANIMAS COUNTY.

McLaughlin Mine. New opening, tram line, tipple and trestle 275 feet by 50 feet high. Shaker screen, elevators, machinery, haulage engine and power plant.

Kenneth Mine. One electric hoist.

Forbes Mine. One 5-foot by 18-foot fan; electric hoist instead of steam.

Red Robin or Wootton Mine. Installed a boiler, two six-pound steam pumps, boiler house, bunk house, ice house and blacksmith shop.

Toller Mine. One Clifford fan, seventy-five pit cars, electric haulage engine and motor, two electric pumps and electric safety lamps installed.

Primrose Mine. New Jeffrey eight-ton locomotive.

Berwind Mine. Feed cutter, telephone system, trolley line to mine, one steel tank, two six-ton electric gathering locomotives, portable pump and motor for drainage, two additional electric locomotives, twenty-five pit cars, one 125-horsepower fan motor. Erected twenty four-room cement block tenant houses, ten two-room shacks for bachelors, boarding house and bath house.

Sopris Mine. Installed telephone system, new haulage engine and coal washery. Fan motor to replace engine.

Frederick Mine. One hundred pit cars, water system and wiring tenant houses for electric lights.

Starkville Mine. Installed telephone system and one 10-ton electric locomotive. Sprinkling system under construction; added fifty new pit cars.

Moreley Mine. Installed telephone system, two double-drum electric hoists, rock dump trestle, power plant feed lines and two electric locomotives, additional pump motor, one portable pump and motor, one sinking pump, one sprinkling car and 125 new mine cars.

Eagle Mine. Two steel water cars.

Tabasco Mine. New larry bin, installed telephone system, addition to electric power plant and house, pipe line for water supply from the Toller dam. Old mine abandoned and new slope being opened. Two additional larry cars equipped with motors, electric air drill for rock work, fifty pit cars, two 50-horsepower electric hoists and electric feed line for new mine.

Eagle Mine. Two steel water cars, installed telephone system. Sprinkling system under construction; also water plant to supply camp.

Tercio Mine. Mine sprinkling system, mine fan and coal-crushing plant for washery.

Frederick Mine. New powder house, sand house and furnace, oil house, forty-five two-room houses for bachelors, concrete foundation under tipple, two pumps and pipe line for mine drainage, 6,000 feet additional trolley line, 7,000 feet feed wire, 3,000 feet additional water pipe for camp and hydrants and a telephone system installed.

Primero Mine. Installed telephone system, new fan and motor, two 15-ton locomotives, electric drill for blacksmith shop, sand house and furnace for drying sand, two portable pumps, 6,000 feet feed wire.

The Colorado Fuel and Iron Company. Equipped a rescue car and several mines have been supplied with helmets.

Delagua Mine. Installed a water system, ventilating fan, new openings, twenty-five tenant houses and sub-station.

Bowen Mine. Sub-station building, electric box-car loader, one electric generator, pump tanks and other machinery.

Hastings Mine. Rescue car apparatus and company building.

Gray Creek Mine. New openings.

Beacon (Green Canon) Mine. One new 16,000-pound capacity electric hoist, one new 9,000-pound capacity electric hoist, one 5-foot by 10-foot Jeffrey fan, motor driven, and one centrifugal pump.

Cokedale Mine. Electric haulage established, two mine motors, pressure pipe sprinkling system greatly enlarged throughout mine, electric shooting system installed, inspector system adopted; put in three Draeger Rescue helmets and general relay equipment for same, and training inaugurated.

Ludlow Mine. One concrete wash house heated by hot water system, water system to supply houses with hydrants, one chemical engine and built concrete house for same, one concrete power house and one transformer house. Changed mine haulage engine and fan from steam to electric power. Added two 50-horsepower motors.

Rapson No. 1 Mine. Built fifteen new tenant houses for employes.

Wootton Mine. Installed two 100-K. W. D. C. generators, two 150-horsepower boilers, erected new power house, installed motor haulage, 1,000-ton tipple and shaking screens, rope haul and rotary dump; six six-room tenant houses, one twenty-room boarding house, blacksmith shop, sawmill, one 75-K. W. A. C. lighting generator, and established lighting system throughout the camp.

Turner Mine. Erected new tipple with shaking screens, motor haulage, extended loading tracks, three four-room houses, five six-room houses, blacksmith shop, one small mule barn, and extended water system.

Empire Mine. New pumping system established, new tipple and other surface buildings erected.

Baldy Mine. Rotary steam hoist installed, new air shaft sunk and new tenant houses built.

LA PLATA COUNTY.

Perin's Peak Mine. Installed electric power line from Durango to mine and erected a new tipple.

Hesperus Mine. Enlarged power plant, installed box-car loader and opened up a new air course.

San Juan Mine. Installed new machinery, erected tramway, tipple and buildings.

MESA COUNTY.

Cameo Mine. New tenant houses, installed electric machinery and rotary screen and elevator.

Garfield Mine. Surface tramway to replace old aerial tram.

PITKIN COUNTY.

Spring Gulch Mine. Installed electric plant, one 600-gallon centrifugal pump, oil storage plant, fire protection and water system for camp, additional pump line and electric air drill for rock work.

ROUTT COUNTY.

Juniper Mine. Power plant, 4,000 feet railroad tracks, three track scales, erected an office building and a boarding house.

Oak Hills Mine. Equipped mine with seven helmets.

WELD COUNTY.

Shamrock Mine. Installed a new boiler, an air compressor and a mining machine.

Golden Ash Mine. Installed electric underground haulage.

Ideal Mine. Sank an air shaft five by six feet, and installed an eight-foot fan, new elevator and bin.

Puritan Mine. Twenty-five new pit cars, new boiler and several new tenant houses.

Parkdale Mine. Fan house, box-car loader house built, installed new Norwalk air compressor and a Cameron pump.

Evans Mine. Four tenant houses and fence around the mine.

Andrew Mine. Erected tipple, engine house, blacksmith shop, scale house, installed one 100-horsepower boiler, one 8½ by 12-foot clutch hoist, wagon chute, three punches, one Rand compressor.

THE NATURE OF SOME COAL DUSTS FROM COLORADO MINES.

John B. Ekeley.

The following tables give the analyses of samples of coal dusts and of mine air taken during the investigation trip made by the Coal Mine Commission appointed by Governor Shafroth.

The coal dust samples were passed through 20, 100, and 200-mesh sieves, and the fractions analyzed. In the fractions passing through the 200-mesh sieve, the analyses show a slight error, because the very fine dust undoubtedly lost some moisture during the screening operation. However, the results for this fine dust are very interesting, because they show that in all cases the composition was approximately the same as in the coarser portions. The analyses show that the non-carbonaceous part of the dust was of about the same state of division as the coal dust itself.

The air samples were collected by allowing water to run out from completely filled glass bulbs, which were then closed airtight. This is the method used by Mr. Chamberlin, of the United States Geological Survey. The small amount of water remaining on the inner walls of the bulbs absorbs carbon dioxide so that the amounts of carbon dioxide shown in the analyses are a fraction of a per cent too low. The striking fact shown by the analyses is the presence, in most cases, of a small amount of methane, even in samples where none was expected. Since it is known that a small amount of methane may act as a primer in an explosion of coal dust, these facts are significant.

ANALYSES OF COAL DUST.

No.	STANDARD MINE	Mesh	Moisture	Volatile Matter	Fixed Carbon	Ash
1	Main north entry, 250 ft. from hoisting shaft. Road dust.	20	13.2	25.8	33.3	27.7
		100	11.5	24.4	30.1	34.0
		200	8.0	23.9	28.5	40.6
2	Same as No. 1. Dust from timbers.	20	9.7	21.8	25.1	43.4
		100	8.5	20.8	27.2	43.5
		200	8.0	21.3	26.0	44.7
3	Fifth north west, room 8, 25 ft. from working face.	20	15.8	24.6	27.2	22.4
		100	12.4	22.2	21.9	34.5
		200	10.1	22.3	26.8	40.8

ANALYSES OF COAL DUST—Continued.

No.	STANDARD MINE	Mesh	Moisture	Volatile Matter	Fixed Carbon	Ash
4	Fifth southwest.	20	16.9	26.1	44.3	12.7
		100	14.8	26.7	43.5	15.0
		200	14.3	27.0	42.4	16.3
5	Intersection of main south and first southwest entries. Road dust.	20	13.8	24.0	35.9	26.3
		100	10.5	25.3	31 2	33.0
		200	9.1	25.1	29.5	36.3
6	No. 7 Parting main south. Road dust.	20	16.8	23.8	37.5	21.9
		100	13.7	22.1	22.0	31 2
		200	12.7	24.5	28.0	34.8
7	Main south at intersection of third east. Dust from timbers and ribs.	20	11.9	22.1	20.1	35.9
		100	11.1	20.2	21.5	37.1
		200	8.9	22.8	29.1	39.2
	HASTINGS MINE					
8	Dust from main slope 600 ft. in, from timbers and ribs.	20	1.8	28.9	48.7	20.6
		100	1.5	28.6	49.2	20.7
		200	1.3	25.7	51.5	21.5
9	Main slope between second and third entries. Road dust.	20	2.4	27.8	46.2	23.6
		100	1.7	28.3	46.4	23.6
		200	1.4	26.3	48.4	23.9
10	Rope parting in main slope between 4th and 6th south. Road dust.	20	2.1	23.8	34.9	39.2
		100	1.6	24.4	36.8	36.2
		200	1.3	23.6	39.9	35.2
11	7th south, 500 ft. from main slope. Trolley.	20	1.8	17.9	30.6	49.7
		100	1.8	18.9	31.8	47.5
		200	1.4	19.0	33.2	46.4
12	Double parting between 7th and 8th cross-cut of 7th south. Road dust. Trolley.	20	1.9	9.6	16.0	72.5
		100	1.8	12.8	19.9	65.5
		200	1.6	13.0	22.2	63.2

ANALYSES OF COAL DUST—Continued.

No.	HASTINGS MINE	Mesh	Moisture	Volatile Matter	Fixed Carbon	Ash
13	Dust from timbers and ribs between 1st and 2nd cross-cut in 7th south.	20	2.2	21.7	32.8	43.3
		100	1.8	21.1	33.9	43.2
		200	.8	22.0	34.4	42.8
	DELAGUA MINE					
14	Fine dust from ribs 3rd north entry, not dislodged by explosion.	20	2.4	21.0	39.9	36.7
		100	2.3	20.0	40.3	37.4
		200	1.1	22.1	39.2	37.6
	PRIMERO MINES					
15	1st East Mine. Dust from ribs, 700 ft. from entrance.	20	1.0	24.4	47.9	26.7
		100	1.0	24.8	46.4	26.2
		200	.5	25.3	47.2	26.1
16	1st North Mine. Dust from ribs in A-12.	20	2.4	20.5	48.0	24.7
		100	1.7	18.1	54.6	25.6
		200	.6	21.7	42.1	26.6
	PICTOU MINE					
17	Main slope 500 ft. in. Roof and ribs.	20	3.3	25.0	33.2	38.5
		100	3.8	23.1	36.3	36.8
		200	1.8	28.2	33.2	36.8
18	8th north off main entry. Ribs.	20	5.3	25.4	36.2	33.1
		100	5.2	22.9	38.5	33.4
		200	2.3	27.9	34.7	35.1
	DANVILLE MINE					
19	Main slope 600 ft. from entrance. Ribs.	20	9.0	39.1	33.0	18.9
		100	8.6	33.5	38.5	19.4
		200	5.6	34.9	30.2	19.3
	SUMMIT MINE					
20	Bug dust, 8th south west.	20	18.0	21.0	54.1	6.9
		100	16.8	21.0	54.3	7.9
		200	....	....	....	....

ANALYSES OF COAL DUST—Concluded.

No.	SOMERSET MINE	Mesh	Moisture	Volatile Matter	Fixed Carbon	Ash
21	Coarse, quite damp stuff from ribs.	20	7.8	26.8	49.3	16.1
		100	6.4	24.3	49.4	29.9
		200	....	....	....	....
	VULCAN MINE					
22	Main entry, 300 ft. in. Dust from ribs.	20	6.2	25.9	49.1	19.8
		100	6.0	27.9	47.0	19.1
		200	3.5	33.0	43.7	20.8
23	Main entry, opposite 8th B, upraise. Ribs.	20	11.5	25.8	54.2	9.5
		100	6.4	33.6	49.5	11.5
		200	1.6	32.9	43.6	12.9
	ROCKVALE MINE					
24	Dust from ribs of 5th south.	20	15.4	10.2	20.9	53.5
		100	12.2	12.8	19.6	56.4
		200	3.1	17.9	11.6	57.4
25	Dust from road in 5th south. Same place as No. 24.	20	9.8	13.4	19.1	49.7
		100	9.2	13.8	21.7	55.3
		200	5.0	17.3	19.0	58.7
26	Dust from timbers, main south entry, 1,500 ft. from shaft.	20	7.2	19.7	39.6	33.5
		100	5.7	21.2	39.0	34.1
		200	2.9	26.1	34.9	36.1

ANALYSES OF MINE AIR SAMPLES.

	STANDARD MINE	CO_2	O	N	CH_4
1	Fifth north east. Main intake, north side.....	.25	17.4	82.35	....
2	Fifth north west, room 8.....	....	20.8	79.2	....
3	Fifth south west, 30 min. after shot.....	.61	19.7	79.69	....
4	Ninth south west, 100 ft. from main entry.....	....	20.5	79.04	.46
5	Main south, 7th double parting.....	....	20.0	80.0	....
	HASTINGS MINE				
6	Main slope, 300 ft. from mouth.....	....	19.7	80.3	....
7	7th south double parting.....	....	20.4	78.5	1.1
8	1st dip off 7th south, shot night before.....	....	20.4	79.6	....
9	7th south at 7th crossing.....	....	20.4	79.6	....
10	Face of 7th south, pillar work.....	....	20.4	79.6	....
	PRIMERO 1ST EAST MINE				
11	Room 8, B-9, west.....	....	20.6	79.4	....
12	Intersection B-9 east and main air course.....	.4	20.6	79.0	....
13	Main return 1,000 ft. from fan.....	.7	19.9	79.4	....
	PRIMERO 1ST NORTH MINE				
14	Room 3, first blind A-12.....	....	20.6	79.2	.2
15	Room 6, A-11.....	.1	20.5	79.4	....
16	Main air course, 75 ft. outside A-7, overcast ..	....	20.2	79.8	....
	COKEDALE MINE				
17	Room 10, 2nd B west, pillars.....	....	20.0	79.3	.7
18	Face of 5th west C.....	....	19.8	79.4	.8
19	Main return under 4th south undercast.....	....	20.0	79.6	.4
	PICTOU MINE				
20	Face of room 5, 4th cross off 8th south.....	....	19.7	80.3	....
21	Bottom of slope, face.....	....	20.5	78.4	1.1
22	Face of 10th north.....	....	19.7	79.9	.4
23	Back entry, intermediate air course, 7th south..	....	19.4	78.8	1.8

ANALYSES OF MINE AIR SAMPLES—Concluded.

	DANVILLE MINE	CO_2	O	N	CH_4
24	Face of main slope	....	18.5	81.1	.4
25	Main slope just above 7th south, above fire	.3	20.5	79.2	....
	SUMMIT MINE				
26	Main return, 100 ft. from shaft	....	19.9	80.1	....
27	Room 11 off 7th south west	.2	20.1	78.9	.8
28	Face of 7th south west	....	20.0	79.7	.2
	SOMERSET MINE				
29	Room 40, 6th west	....	20.5	78.1	1.4
30	Room 2, 9th west	....	20.2	78.8	1.
31	Main entry, 9th west	.1	20.4	79.5	....
32	Face of main slope	....	20.1	78.7	1.2
33	Main return, 75 ft. from fan	.2	20.6	78.8	.4
	VULCAN MINE				
34	Face of workings, main entry, 600 ft. in	....	20.5	78.9	.6
35	No. 9-B upraise, 25 ft. from entry	.6	20.1	78.7	.6
36	Cross-cut between 8-B and 9-B upraises	.4	20.5	78.5	.6
	ROCKVALE MINE				
37	Room 28, C dip	.2	20.0	78.6	1.2
38	1st dip, 5th south, off C dip	....	19.8	78.9	1.3
39	Main return in main south, 1,500 ft. from shaft	....	19.7	79.1	1.2

The dust samples from the Standard and the Summit mines, which are probably representative samples of dusts from the Boulder county field, show a fairly high percentage of moisture. This would tend to make these dusts safer than those of the southern fields, which are very dry. However, it would be dangerous to trust to this for safety from explosions, since we have not enough data on this question as yet. These dusts from the ribs and timbers and from the roadways usually contain considerable fire clay, but the results from experiments at the Pittsburg testing station on similar coal dusts containing a high percentage of fire clay have shown that even such dusts are dangerous.

The dusts in the mines in the southern part of the state are without doubt very dangerous. A dust having a composition: moisture, 3.41; volatile matter, 17.98; fixed carbon, 47.22; ash,

21.39, was tried in the explosion gallery of the Pittsburg testing station. The dust exploded from the effect of a blown-out shot of 500 grams of black powder, and propagated the flame through the entire length of the dusted gallery, and twenty-seven feet beyond the dust zone.

Similarly, a road dust, rich in rock dust, giving the following analysis: moisture, 2.75; volatile matter, 15.45; fixed carbon, 24.85; ash, 56.95, exploded, and propagated the explosion twenty feet beyond the dust zone. All the dusts in the tables except Nos. 12, 24 and 25, would be far more likely to explode than the samples experimented upon at Pittsburg, as may be seen by comparing the analyses.

An interesting dust is No. 14, which was taken from a sheltered place on the ribs of the third north entry of the Delagua mine, and which had not been dislodged by the explosion. This may be taken as a fair sample of the Delagua mine dust, which, without doubt, contributed its share to the explosion. This dust varies little in composition from the dust found in the other mines of that part of the state.

It is a pleasure to say that, in the Cokedale mine, there was very little dust; in fact, we found no suitable sample for analysis. In the Somerset mine there was practically no dust, though, after some trouble, we were able to get a sample.

Of the mines we visited, almost all were in danger from coal dust, and it is fair to assume that the great majority of the mines of the state are in the same condition. This matter should be remedied by proper legislation, requiring that the dust be rendered harmless by means of the addition of a large amount of moisture, and possibly by the removal of the resulting mud from the mine.

University of Colorado, January 1, 1911.

In November, 1910, Governor John F. Shafroth appointed a commission, consisting of Dr. Victor C. Alderson (President of the State School of Mines), Dr. John B. Ekeley (Professor of Chemistry in the University of Colorado), R. D. George (Professor of Geology in the University of Colorado, and State Geologist), and James Dalrymple (State Inspector of Coal Mines), to inquire into the condition of the coal mines of the State, and the causes of the many accidents in those mines, and to suggest remedial legislation for the consideration of the Eighteenth

General Assembly of the State, which would meet in January, 1911. The magnitude of the task assigned, and the shortness of the time, rendered it impossible for the commission to make an investigation satisfactory to themselves, or of such thoroughness as the gravity and importance of their problem demanded. They have therefore suggested that the work be continued, and a more thorough investigation be made, and that the results be embodied in a report to the Nineteenth General Assembly. The following is a copy of the bill drafted by the commission and submitted to the Governor. The end sought in the drafting of the bill was to secure the safety of the health and life of the miners without imposing unnecessary burdens upon the mine operator. There are features of this bill with which the commission was not satisfied, but they are conscious of having discharged the duties imposed upon them to the best of their ability, in the time at their disposal.

House Bill No. 542. By Mr. Pearson.

A BILL FOR AN ACT RELATING TO THE OPERATION AND INSPECTION OF COAL MINES.

Be it Enacted by the General Assembly of the State of Colorado:

Section 1. DEFINITIONS.

OWNER. That, whenever the word "Owner" is used in this act, or any act amendatory thereto, it shall be taken to mean and include "Owner, Lessor, Lessee, Manager, Superintendent, Operator, or Agent" thereof.

COAL MINE. That, whenever the words "Mine" or "Coal Mine" are used in this Act, or any Act amendatory thereto, they shall be taken to mean a property opened, or developed, or operated, for the purpose of mining or taking out coal, and they shall include all parts of the mining plant, whether on the surface or under ground, which contribute directly or indirectly to the mining or handling of coal.

Sec. 2. CHIEF INSPECTOR OF COAL MINES, DEPUTY INSPECTORS, AND DISTRICTS.

In carrying out the provisions of this Act, there shall be appointed, as hereinafter provided, a Chief Inspector of Coal Mines, seven (7) Deputy Inspectors, and one Electrical Inspector.

Whenever there exists a vacancy in the offices of Chief or Deputy Inspectors or Electrical Inspector, the remaining Inspectors, excluding the Electrical Inspector, shall submit from each of four of the inspectoral districts hereinafter provided for, to the Governor, the names of two reputable coal miners of known ability and experience. From the names so submitted, the Governor shall appoint one miner from each of the four districts, and the Governor shall also appoint a mining engineer of like ability and experience, and these five men, so appointed, shall constitute a Board of Examiners, whose duty it shall be to inquire into the character and qualifications of the candidates for the offices left vacant. The representatives from the inspectoral districts on successive Boards of Examiners, shall be appointed in numerical order so that all the seven districts shall share equally in the appointments to said Boards. The Board of Examiners, after being duly organized, having taken and subscribed, before any officer duly authorized to administer the same, the following oath, namely: "We the undersigned do solemnly swear (or affirm) that we will perform the duties of examiners of applicants for appointment as Inspector of Coal Mines, to the best of our abilities, and that, in recommending or rejecting such applicants, we will be governed by the evidence of qualification to fill the position under the laws creating the same, and not by any consideration of political or personal favors, that we will certify all whom we may find qualified according to the true intent and meaning of this Act, and none others, to the best of our judgment." The Board of Examiners shall then proceed to the examination of those who may present themselves as candidates for said office or offices; and shall certify to the Governor the names of all such applicants as any four of the examiners shall find competent to fill the office under the provisions of this Act, arranging their names according to their qualifications and designating the persons not qualified, which certification shall be filed in the office of the Secretary of State. The qualifications of the candidates for said office or offices shall be as follows, namely: They shall be citizens of the United States and of the State of Colorado, of temperate habits, of good repute as men of personal integrity, shall have attained the age of thirty years, and shall have had at least five years' experience in the workings of the coal mines in Colorado, and shall have had eight years' practical experience in the workings of mines in the United States, and have a practical knowledge of coal 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 firedamp, and of the nature and properties of coal dust. The Board of Examiners shall receive six dollars ($6.00) per day and their actual and necessary expenses, while in actual performance of duties, to be paid out of the Coal Mine Inspection Fund hereinafter provided, upon the filing of the certificates of the Examining Board in the

office of the Secretary of State as herein provided. The Governor shall from the names certified appoint the person or persons, possessing the best qualifications, to the vacant office or offices of Inspectors of Coal Mines. The Chief Inspector of Coal Mines shall hold office for four years from the date of his appointment and qualification; he shall receive an annual salary of three thousand dollars ($3000.00) and necessary and actual expenses in the performance of his official duties, to be paid monthly out of the Coal Mine Inspection Fund hereinafter provided; during his term of office he shall reside in Denver, and shall have an office in the State Capitol in Denver, and shall devote his entire time to the duties of his office; he is hereby authorized and directed to purchase such instruments, apparatus, safety lamps, books and stationery as may be necessary for the proper discharge of his duties and the duties of the Deputy Inspectors and the Electrical Inspector under this Act. He is hereby authorized and directed to have the coal mining laws of the State printed in convenient form for distribution, and he shall distribute copies of said law gratis to the coal mine employees throughout the State, and he is further authorized and directed to have section 22 of this act printed in the necessary foreign languages and posted in a conspicuous place near the entrance to each and every coal mine; he is hereby authorized to employ a clerk whose salary shall not exceed fifteen hundred dollars ($1500.00) per annum, payable monthly, and a stenographer whose salary shall not exceed twelve hundred dollars ($1200.00) per annum, payable monthly, both of which salaries shall be paid out of the Coal Mine Inspection Fund; he shall, before entering upon the discharge of his duties, file with the Secretary of State a bond in the sum of ten thousand dollars ($10,000) with sureties to be approved by the Judge of the District Court of the District in which he resides, conditioned for the faithful discharge of his duty, and shall take an oath, or affirmation, to discharge his duties impartially and with fidelity, to the best of his knowledge and ability; he may be removed from office by the Governor only for inefficiency, for failure to carry out the provisions of this Act, or for malfeasance in office.

The Chief Inspector of Coal Mines is hereby authorized and directed to divide the State into seven (7) coal mine inspection districts, dividing the work of coal mine inspection as nearly as possible into seven (7) equal parts, for which there shall be appointed by the Governor seven Deputy Inspectors as herein provided. The Deputy Coal Mine Inspectors shall be appointed for a term of four years, except that in case of an appointment to fill an unexpired term such appointment shall be for the unexpired term only.

It shall be unlawful for the Chief Inspector of Coal Mines or any Deputy Coal Mine Inspector or the Electrical Inspector to be interested as owner, operator, engineer, stockholder, manager, director, or otherwise in any coal mine. Each Deputy

shall be assigned to one of the seven coal mining districts of the State; he shall devote his entire time to his duties; he shall receive an annual salary of two thousand dollars ($200.00) and actual and necessary expenses when in performance of his official duties, payable monthly, from the Coal Mine Inspection Fund. A Deputy Coal Mine Inspector may be removed from office by the Governor on consultation with, and by the advice of, the Chief Inspector of Coal Mines only for inefficiency, for failure to carry out the provisions of this Act, or for malfeasance in office.

It shall be the duty of the Chief Inspector, or his Deputies, to enter into and to examine thoroughly each and every coal mine in the State at least once every sixty days to see that the provisions of this Act are observed and strictly carried out. The Chief Inspector, or his Deputies, 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 and by day, but not so as to impede unnecessarily the working of the mine. After each inspection there shall be posted in a conspicuous place near the entrance of the mine his report of the conditions of the mine, and he shall send a copy to the Chief Inspector. The removal of said report by an unauthorized person shall be deemed a misdemeanor, punishable by a fine of not less than one hundred dollars ($100.00) nor more than five hundred dollars ($500.00). The Chief Inspector of Coal Mines and the Deputy Inspectors, holding office on the first day of October, 1911, shall continue in office until the regular expiration of their terms of office as provided elsewhere in this Act.

Sec. 3. ANNUAL REPORT OF THE CHIEF INSPECTOR.

The Chief Inspector of Coal Mines shall make to the Governor an annual report not later than the third day of January, which shall show the number of persons employed in and about each mine, the number of mines, the extent to which the law is obeyed, the progress made in the improvements sought to be secured by the passage of this Act, the number of accidents and deaths resulting from injuries received in each mine, with the cause of each, statistics showing the output of coal, the developments made at each mine, information concerning the production and transportation of coal to market, recommendations for the more complete enforcement of this Act, and such other information of public interest as comes under the provisions of this Act.

The Secretary of State is hereby authorized to have printed two thousand copies of said annual report, at the expense of the State, for distribution to members of the Legislature, mine owners, and others interested in coal mines.

Sec. 4. POLICE POWER OF INSPECTORS.

The Chief Inspector of Coal Mines, each Deputy Inspector, the Electrical Inspector, each Company Inspector, and every

Sheriff and Constable in his respective county, is authorized and required to enforce this Act, and shall have full power and authority, and it shall be the duty of every such officer, to arrest any person or persons who, he has reason to believe, is guilty of any violation of this Act; and the Chief Inspector, the Deputy Inspectors, and the Electrical Inspector shall have full power and authority, to open, and enter all mines for the purposes of inspection under this Act.

Sec. 5. POWER TO CLOSE A MINE.

Whenever any owner so operates a coal mine in this State that, through the violation of any of the provisions of this act, it becomes, in the judgment of the deputy inspector in whose district the mine is situated, or, in the case of the electrical apparatus of such mine, in the judgment of the electrical inspector, seriously dangerous to the health and lives of the miners or other employes, he shall at once notify the owner of the mine in which such dangerous condition exists, and order the immediate removal of such condition. If the owner fails to remove such condition at once, the deputy inspector or the electrical inspector, as the case may be, shall immediately report such facts to the chief inspector. The said chief inspector with an electrical inspector or a deputy inspector as the case may be, of another district, shall at once inspect said mine. If they concur in the report of the deputy inspector or of the electrical inspector, the chief inspector may, within thirty days thereafter, apply, in the manner now provided by law, for a writ of injunction restraining the operation of said mine until the provisions of this act are complied with; and the respective district attorneys are hereby required to prepare and present such application, upon the written request of the chief inspector, and such writ shall be issued or refused according as the court, or judge, in vacation, shall determine from the facts presented upon the hearing; Provided, that said chief inspector may, at his discretion, allow said owner such time as may be reasonably necessary to comply with the provisions of this act before beginning such civil proceedings.

If, at any time, the deputy inspector or the electrical inspector shall discover any condition of so grave a character that in his opinion delay would be disastrous to life, he shall have power to withdraw temporarily all persons from such dangerous place until such dangerous condition or conditions have been removed and the provisions of this act complied with.

Sec. 6. ANNUAL REPORT OF OWNER.

It shall be the duty of the owner of each and every coal mine in this State, on or before the tenth day of December of each year, to make a report to the Chief Inspector of Coal Mines, duly sworn to before a Notary Public, covering the twelve months preceding the previous 30th day of November, showing the total number of tons of coal mined, improvements

made; a complete list of all accidents of a severity sufficient to incapacitate the employee from work, showing the nature and cause of accident, with the age and nationality of each person injured, whether married or single, the number of children left; the name of the owner or other officials to whom official communications shall be sent, together with such information as may be called for in the blanks issued by the Chief Inspector for such report.

Failure to make such report shall be deemed a misdemeanor punishable by a fine of not less than twenty-five dollars ($25.00) nor more than one hundred dollars ($100.00) for each and every day of such failure.

Sec. 7. NOTICE OF ACCIDENTS IN MINE.

Whenever loss of life, or serious personal injury, shall occur, by reason of any accident whatsoever, in or about any coal mine, it shall be the duty of the owner thereof to give notice within twenty-four hours to the Deputy Inspector in whose district the accident occurs, and to the Chief Inspector of Coal Mines, and if any person is killed in said accident, to the Coroner of the county also. The Chief Inspector or a Deputy 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 accident, and shall file a record thereof in the office of the Chief Inspector.

Failure to notify the Deputy Inspector and the Chief Inspector of such accident, and the Coroner of such fatality, shall be deemed a misdemeanor punishable by a fine of not less than fifty dollars ($50.00) nor more than one hundred dollars ($100.00.)

Sec. 8. CHECKING IN AND OUT SYSTEM.

It shall be the duty of the owner of each and every coal mine in this State to install an effective system of checking in and out, whereby every employee on entering the mine shall be given, by a checkman, a numbered check and said check shall be collected by the checkman when the employee leaves the mine.

Failure on the part of the owner to provide such checking in and out system, shall be deemed a misdemeanor and shall be punishable by a fine of not less than twenty-five dollars ($25.00) nor more than fifty dollars ($50.00) for each day of failure to provide such system.

Sec. 9. COMPANY INSPECTORS.

The owner of each and every mine in this State shall employ, in addition to the regular mine foreman, pit boss, firebosses and shotfirers, a company inspector for each one hundred

miners employed, or fractional part thereof, in excess of fifty men employed, provided that the Deputy Inspector in consultation with the Chief Inspector may determine a greater or less number of company inspectors as, in his judgment, the health and safety of the miners require. It shall be the duty of such inspectors to use every means at their disposal to prevent accidents, and to carry out the duties imposed on them in Section 4 of this Act.

Failure of the owner to employ such company inspector, or inspectors, is hereby declared a misdemeanor punishable by a fine of not less than ten dollars ($10.00) nor more than twenty-five dollars ($25.00) per day for each day of such failure.

Sec. 10. DAILY RECORD OF THE CONDITION OF MINE.

It shall be the duty of the owner of each and every mine in this State to keep, or cause to be kept, in a book supplied by the Chief Inspector of Coal Mines, a daily record of the condition of said mine, and said book shall be signed daily by the company inspector or inspectors, by the mine foreman, and by the fireboss or bosses. The said record shall show the daily condition of the mine with special reference to the presence of gas, the condition of working places, the condition of haulage ways, the ventilation, the condition of the safety and hoisting appliances, the condition of manways and exits, a complete list of all accidents of a severity sufficient to incapacitate the employee for his work, the nature and cause of such accidents, with the age and nationality of each person injured, whether married or single and the number of children, and such other information as the Chief Inspector of Coal Mines may require. The said record book shall be kept at the office of the mine in the county where such mine is situated, and shall be open at all times to the Chief Inspector or Deputy Inspectors. On the first day of each month, said record shall be sent to the Chief Inspector of Coal Mines at his office in Denver.

Failure to comply with the provisions of this section shall be deemed a misdemeanor punishable by a fine of not less than twenty-five dollars ($25.00) nor more than fifty dollars ($50.00) for each and every day of such failure.

Sec. 11. NOTICE OF ABANDONMENT OF MINE OR WORKINGS.

It shall be the duty of the owner of each and every coal mine in this State to notify the Chief Inspector of Coal Mines of the abandonment of any mine, or of the workings of any mine, or of the resumption of work after any abandonment or discontinuance for a period exceeding 30 days, or any change in the name of a mine or its owner, within ten days after of such abandonment, resumption, or change of name or owner. Failure to comply with the provisions of this Section shall be deemed a misdemeanor punishable by a fine of not less than

twenty-five dollars ($25.00) nor more than fifty dollars ($50.00) for each and every day of such failure.

Sec. 12. EXPLOSIVES.

In each and every mine in this state, only such explosives may be used as have withstood the tests of the United States Bureau of Mines and are classified at the time by such Bureau as "permissible" explosives; only enough powder for one day's use shall be taken into a mine at one time, by any one miner, and said powder shall be kept in a locked wooden box, at least five feet from any track and at least twenty-five feet from any similar box; shots shall not be overcharged; dependent shots shall not be permitted; all rooms shall be sprinkled with water for a distance of sixty feet from the working face before shot firing, provided that this requirement need not be enforced if, in the judgment of the Chief Inspector of Coal Mines, or Deputy Inspector, the health and safety of the miners or other employees do not require it; if gas is known or suspected to occur in a working place, no shot shall be fired therein until an examination, made preceding the time of firing, by a competent person, using a lamp which will easily detect two per cent. of gas has shown the absence of that amount of gas from all places within sixty feet of the point where the shot is to be fired; no shooting shall be allowed unless the coal is undermined or sheared six inches deeper than the hole, and four feet shall be the maximum thickness of any shot, provided that, where it is impracticable to mine coal in said manner, the owner may be released from this requirement by application to the Chief Inspector of Coal Mines, if such owner proves to the satisfaction of the Chief Inspector of Coal Mines that he can and will by other effective means comply with the spirit and intent of the law in safeguarding the health and lives of the miners and other employees. Shots shall be tamped only with clay or similar incombustible material; primers shall be handled only by shot firers, who shall prepare and insert the charge and place the first round of tamping on the shot; the tamping may be finished by the miner; only wooden tamping bars, with or without copper tips, may be used; and all blasting shall be done only by shot firers or by an electric battery after all employees have left the mine, but this does not apply when grading is being done at night and there are not more than four men in the mine, exclusive of the shot firers; provided that in mines where the long-wall system of mining is used, special shot firers need not be employed.

Any person, or persons, convicted of violating any of the provisions of this section shall be deemed guilty of a misdemeanor and punished by a fine of not less than twenty-five dollars ($25.00) nor more than one hundred dollars ($100.00) for each offence.

Sec. 13. UNDERGROUND WORKINGS.

In each and every mine in this state, rooms shall not be turned inside of the last entry cross-cut; the maximum distance between props in room or pillar work shall not exceed seven feet; cross-cuts between rooms shall be continuous, provided that where the block system is used it shall not be necessary to cross-cut the block; all room and entry cross-cuts shall be made at distances not exceeding seventy feet, provided that, in entry work this may be extended to one hundred feet, if brattice is carried so that the working face shall not be more than seventy feet in advance of the air current.

Every owner shall provide and maintain a water system for the purpose of conducting water to the face of each working place and throughout the entire open part of the mine in sufficient quantity to wet down the dust, and the said owner shall cause the dust to be wetted down on the roof, walls, timbers, and in the roadways, except that to accomplish this purpose he may use steam whenever possible, and the resulting mud shall be removed from said mine, provided that in parts of mines, where by reason of the natural wet condition such wetting may not be necessary, or, where at the working faces such wetting may not be required for the health and safety of the miners, the owner may on application to the Chief Inspector of Coal Mines be released from the requirements of this provision for such wet places and for such wet working faces.

All doors and casings, stoppings, overcasts, undercasts, and regulators up to within five hundred feet of the working face shall be made of incombustible material, provided that whenever such conditions exist in any mine that the health and safety of the miners can be safeguarded by other means than those required by this provision, then the owner may, by application to the Chief Inspector of Coal Mines, be released from this requirement if the owner, by other effective means, complies with the spirit and intent of the law in safeguarding the health and lives of the miners and other employees.

All underground stables, storage rooms, harness shops, motor rooms, engine rooms, pump rooms, and oil houses shall be built of incombustible material; all drift and slope openings shall be lined with incombustible material for a distance of one hundred fifty feet from the mouth of the opening; fire extinguishers shall be installed in such numbers as may be required by the Chief Inspector of Coal Mines; sufficient places of refuge at the sides of all main haulage ways in mines without man-ways shall be provided at intervals of not more than fifty feet apart and shell be kept whitewashed; there shall be cut in the side of every hoisting shaft, at the bottom thereof, a traveling-way, not less than three feet wide and six feet high, 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 the hoisting apparatus.

Any owner guilty of violating any of the provisions of this Section shall be deemed guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars ($100.00) nor more than five hundred dollars ($500.00).

Sec. 14. VENTILATION.

The owner of every coal mine, whether shaft, slope or drift, shall provide and maintain for every such mine an amount of pure air for ventilation produced by means of a fan or steam jet, not less than one hundred cubic feet, and such additional number of cubic feet as may be ordered by the Chief Inspector of Coal Mines, 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 by the split system, in such manner as to dilute and render harmless and expel the poisonous and noxious gases from each and every working place in the mine. In all mines opened after the passage of this Act, the installation of underground fans is prohibited except in the case of pitching veins where a hand-power blower may be installed as a temporary means of ventilation; not more than sixty-five men shall be dependent on one split for their air; all breakthroughs or airways, except those last made near the working faces of the mines, shall be closed and made air tight by brattice, trap doors, or otherwise, so that the currents of air in circulation in the mine may pass to the interior of the mine, where the persons employed in such mine are at work; all working places shall be kept free from standing gas; every working place shall be carefully examined every morning with safety lamp by a competent person or persons, before any of the workmen are allowed to enter the mine; not more than three hours shall elapse between the time any working place is examined and the time when the miners begin work, and the person making such examination shall mark on the face of the workings the date on which the examination is made in all mines, whether they generate firedamp or not; danger signs shall be placed wherever dangerous conditions of any kind are found to exist, and such danger signs shall be heeded; the doors used in assisting or directing the ventilation of the mine shall be so hung and adjusted that they will close of their own accord; in old workings where gas accumulates which cannot be removed by the ordinary means of ventilation, either drill holes shall be driven from the surface to tap such gas accumulations, or the old workings shall be walled off by gas tight stoppings; the owner shall employ a competent person or persons who shall keep a careful watch over the ventilating apparatus, air-ways, manways, pumps, timber, the drainage of the manways or approaches to the second opening, and shall see that, as the miners advance their excavation, all loose coal, slate, or rock overhead is carefully secured against falling in or upon the

traveling ways, and that sufficient timber, of suitable length and size, and all other necessary materials are furnished for the places where said materials are to be used and placed in the working places of the mines, and who shall measure the ventilation at least once a week at the inlet and at the outlet, and also at or near the face of all entries; in all mines opened after the passage of this Act, fans shall be so constructed that the air current can be reversed by the opening and closing of the fan house doors, and shall be set off a distance of not less than forty feet from the air course, and all fans shall be equipped with an extra emergency engine or motor; in all mines fans shall be kept running continuously day and night.

All stables shall be independently ventilated and the air from the stables shall be returned to the return airway and shall not be carried into the other parts of the mine.

Any person violating the provisions of this Section shall be deemed guilty of a misdemeanor and shall be punished by a fine of not less than one hundred dollars ($100.00) nor more than five hundred dollars ($500.00).

Sec. 15. TELEPHONES—LAMPS.

The owner shall provide and maintain an adequate telephone system from the surface to the bottom of the shaft, slope, or drift, and to all double partings where trips are made up; after the first day of October 1912, only electric, or safety lamps approved by the Chief Inspector of Coal Mines shall be used and shall be the property of the owner and shall be maintained in good condition, kept in a special room at the surface, and carefully examined both when delivered to the miner and when returned by him.

Any owner guilty of violating any of the provisions of this section shall be deemed guilty of a misdemeanor and shall be punished by a fine of not less than twenty-five dollars ($25.00) nor more than one hundred dollars ($100.00) for each and every day of such violation.

Sec. 16. BORE HOLES NEAR ABANDONED WORKINGS; GOB FIRES; SAFETY DEVICES; ENGINEERS; GATEMEN; SIGNALS; SHAFTS; CAGES; RESCUE APPARATUS.

The owner of each and every coal mine in this state 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. Side holes shall not be more than twenty-five feet apart and to a like depth. It shall not be lawful for any owner 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 twenty-five degrees shall be understood as vertical veins, under this Act.

The owner shall remove all fine coal or slack which may accumulate in the working places or gobs. Where spontaneous combustion or gob fires are known, or even suspected, to exist, a careful inspection shall be made daily of the workings by the mine foreman or other competent person. If any increase of 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 means, 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 owner to build at once suitable stoppings of double walls of a concave shape at least two feet apart, with ends, top and bottom built into cuttings made into the coal or rock, and the space between the walls shall be filled in with sand or other fine earthy material, which shall be closely tamped, so as to fill up all cracks and crevices. The outside of said walls shall be carefully plastered with lime-mortar or cement, so as completely to isolate the fire from the air. Should combustion still be suspected to be going on, then steam, where practicable, shall be injected toward the fire from pipes passing through said walls or stoppings, or in lieu of this the site of the fire shall be flooded with water.

On all underground roads, where coal is hauled by machinery, where the grade averages more than six (6) feet to the hundred (100) and where said roads are used as traveling ways for men, double draw bars shall be attached to the bottom or other parts of every car, so that two separate couplings shall be used to connect each and every car lowered or hoisted on any road as herein defined. The hooks which connect with the draw bar of the car shall be constructed with a clevice, or other contrivance, so as to prevent them from becoming detached while the cars are in motion; and there shall be a head light on the front end of each train of cars; and double chains with approved safety hooks shall be attached to the socket of the hoisting ropes.

Only an experienced, competent, and sober engineer shall be placed in charge of, or operate, an engine for lowering men into the mine or hoisting them out of the mine.

Competent, sober gatemen shall be stationed at the top and bottom and at all intermediate landings of all shafts used for hoisting men, and they shall see that not more than the proper number of men are permitted to enter or ride in the cage at one time. They shall also give all signals to the hoisting engineer, and shall use the following code:

One bell, hoist (when engine is at rest); one bell stop (when engine is in motion); two bells, lower; three bells, men on cage about to ascend or descend; four bells, blasting signal. Upon receiving the blasting signal of four bells the engineer must answer by raising the bucket a few feet and letting it back slowly, and then upon receiving the signal of one bell he shall hoist the men away from the blast.

Special signals in addition to the above may be used in any mine, provided they are easily distinguishable by their sound, or otherwise, from the foregoing code and do not interfere with it in any way.

An easily legible copy of the above code, and of any special code adopted in any mine, shall be printed on a board or metal plate not less than 18 inches by 18 inches, and shall be securely posted in the engine room, at the collar of the shaft and at each level or station.

No person shall interfere with or impede any signaling in the mine within this state, nor shall knowingly damage any such signal system, nor shall knowingly give or cause to be given any wrong signal within or about the mine, nor shall ride upon any cage, skip, or bucket at a time when signals have been given informing the hoisting engineer that no person is so riding.

In all mines the owner shall provide at the opening of every shaft an approved safety gate and approved safety catch, and sufficient cover overhead on every cage used for lowering or hoisting persons; and the said owner shall see that sufficient flanges or horns are attached to the sides of the drum of every machine that is used for lowering or hoisting persons in or 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 Chief Inspector of Coal Mines; and bridle chains shall be attached to the main link from the cross pieces of the cage; and no single link chain shall be used for lowering or hoisting persons in and out of said mine; and suitable depth indicators shall be attached to all hoisting apparatus; and each cage used for lowering or hoisting men in and out of a mine shall be provided with hand holds for at least ten persons.

At night a stationary light shall always be kept burning at the top of the shaft of operating mines to show the landing and to serve as a warning.

All shafts made after the passage of this Act shall be lined with concrete or other incombustible material; all shafts shall be provided with approved safety gates at the top and at every landing other than the bottom of the shaft. At all landings where men get on or off the cage, supports must be so set and adjusted as to act automatically and securely hold the cage when it is at rest. In addition to the regular hoisting machinery every shaft used for lowering or hoisting men shall be provided with a complete emergency windlass of approved design and ample strength for hoisting men from the mine.

All cages shall be of such construction that, in cases of emergency, they may be used for lowering or hoisting men; they shall be equipped with approved safety catches; and those having unstable or self-dumping platforms shall be provided with proper

locking devices for fixing the platforms, and such locking devices shall be used when such cages are used to lower or hoist men.

In lowering or hoisting men, the speed of the cage shall not exceed six hundred (600) feet per minute. No person shall be lowered or hoisted in or on any cage or other hoisting apparatus carrying powder or other explosives, tools, timber, a mine car, or other load. The Chief Inspector of Coal Mines shall regulate the number of men that may be lowered or hoisted at one time, and a notice of the number shall be posted in a conspicuous place at the top and bottom of the shaft and at all other landings. In no case shall the total weight of the men, estimated at 160 pounds each, exceed one-fifth the proved load capacity of the brakes, ropes, links, and other connections bearing the cage.

Every mine shall be equipped with rescue apparatus as follows: four helmets or other independent breathing devices, one resuscitating apparatus, a suitable supply of auxiliary apparatus, and "first aid to the injured" outfit. Also at each mine, the owner shall have trained for rescue work not less than three crews of four men each, which crews shall be practically familiar with the use and operation of the rescue apparatus, provided that where several mines are located so near together that one set of rescue apparatus may be used conjointly, then the Chief Inspector of Coal Mines may permit such joint ownership, but in no case shall there be allowed less than the specified number of rescue crews at each mine, except that in mines employing less than twenty-five men the Chief Inspector shall determine the amount of rescue apparatus and the number of rescue crews necessary.

Failure to comply with any of the provisions of this Section shall be deemed a misdemeanor punishable by a fine of not less than fifty dollars ($50.00) nor more than two hundred dollars ($200.00.)

Sec. 17. OUTLETS AND ESCAPEMENT SHAFTS.

In each and every mine in this state opened after the passage of this Act, traveling ways or manways must be provided so that the employees shall not have to travel the haulage ways going to or coming from their work. Such traveling ways or manways shall be maintained in good condition and free from noxious gases, ponded water, and all other obstructions to the free and safe passage of men.

Every coal mine in this state, and every separate coal seam worked in the same mine, whether such mine or seam is worked by shaft, slope or drift, shall have at least two properly equipped and properly maintained openings available for exit to all persons working in such mine. One of these openings may be the main delivery shaft or opening. The second opening, or escapement, may be a shaft, or a slope, or a drift, or an underground passage way to an available outlet of a contiguous, operating mine, and such outlet of a contiguous mine and the approaches to

such outlet shall be maintained in good condition. The escapement opening shall be separated from the main opening by not less than three hundred feet of natural strata, except by the written consent of the Chief Inspector, and by not more than three hundred feet of natural strata, except by the consent of the owner. An air shaft may be used as an escapement providing that such air shaft is divided into two compartments by a close partition of incombustile material and provided further that one compartment is reserved exclusively for the purpose of ingress and egress. Every escapement shaft over seventy-five (75) feet in depth shall be equipped with a safe, adequate, complete and independent hoisting plant which shall be kept in a condition of readiness for immediate use, provided that, where a hoisting plant is installed, a single compartment shall be sufficient.

The provisions and conditions required in section 16 of this act for securing the safety of the men shall apply in detail to escapement shafts.

Every escapement shaft over seventy-five (75) feet deep and not equipped with a hoisting plant, shall be provided with a safe and substantial stairway, set at an angle not greater than forty-five (45) degrees with the horizontal, and such stairway shall be provided with hand rails and with platforms or landings at each turn of the stairway. If the escapement outlet is a slope, or a drift, or a passage to and through a contiguous operating mine, it shall be not less than five feet wide and six feet high, and shall be properly graded and drained and shall be maintained in a safe and available condition. Every escapement outlet of whatever sort shall be kept free from steam, water, ice, noxious gases, and all other obstructions to the free passage of the miners and other employees.

Passage ways shall lead from the main haulage ways, and from the regular lines of travel within the mine to the escapement outlet. Such passage ways shall be maintained in a safe and available condition and shall be kept free from noxious gases, ponded water, and obstructions of all kinds, to a height and a width of not less than five feet. At all points where roadways or entries intersect such passage ways to the escapement outlet, and at all other points where confusion may arise, conspicuous sign boards shall indicate the direction to the escapement outlet. The pillars in entries between the main outlet and the escapement outlet shall not be removed without the written consent of the Chief Inspector of Coal Mines.

Each and every head frame placed over any escapement shaft, after the passage of this Act, shall be constructed of fire proof material, and it shall be unlawful to erect or place any inflammable structure or any inflammable material between the main shaft or opening and the escapement shaft or opening.

When an owner is opening a new mine, or a new seam, or driving a connection between two outlets, the Chief Inspector of

Coal Mines or the Deputy Inspector shall allow him a reasonable time to do the work necessary to secure the second outlet, but in no case shall more than ten men be allowed to work in the mine at any one time for any purpose whatsoever, until such escapement outlet is completed, and of the ten men so employed, as many as possible shall be engaged on the work of making the second opening, which shall be started immediately after the coal has been reached and development work has begun in the first opening. In any mine in which the second opening has become unavailable by reason of the final robbing of the pillars or otherwise, it shall be lawful to allow as many as ten men, but not more, to work in such mine at any one time, provided always that the cage, or other safe means of egress, shall be available to them at all times. In case the owner does not own suitable surface ground for a second 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 corporation, or not; but no land shall be appropriated under the provisions of this Act until the Court is satisfied that suitable premises cannot be obtained by contract upon reasonable terms.

Failure to comply with the provisions of this section shall be deemed a misdemeanor punishable by a fine of not less than fifty dollars ($50.00) nor more than two hundred dollars ($200.00).

Sec. 18. MAPS.

The owner of each coal mine in this State shall make, or cause to be made: 1, a map of the surface of the property; 2, a map of the underground workings of each and every seam of coal worked in the same mine; 3, a surface map and proposed plan of operation of any new mine to be opened, and of every important extension or rearrangement of a mine already opened and operated; 4, a final and complete map of every mine about to be abandoned, or indefinitely closed.

Whenever the surface features of a mine property, as herein outlined, can be shown upon the underground map without obscuring its details or impairing its usefulness, a separate surface map need not be made.

All maps shall be made on a scale not to exceed 100 feet to the inch, and shall bear the name or number of the mine, its location as to county, township and section, the name of the company and owner, the north point, the scale to which the map is drawn, an explanatory legend, and the certificate of the engineer or surveyor as to the accuracy and date of the survey.

All mine maps and plans herein before mentioned shall be extended and corrected at least once every six months, and corrected copies shall be available on the last day of each of the

following months: namely; June and December. True copies of all maps and plans shall be provided as follows: one copy of each map and plan shall be kept in the office of the mine, one copy of each shall be deposited in the Chief Inspector's office in the Capitol, Denver, and one copy of each shall be deposited with the recorder of the county in which the coal mine is located. The map and plans delivered to the Chief Inspector shall be the property of the State, shall be kept at the office of the Chief Inspector, and shall be open to the examination of all persons interested, but such examination shall be made in the presence of the Chief Inspector, who shall not permit any copies of the map or parts of the map to be made without the written consent of the owner.

The surface map shall be made on transparent or translucent cloth or paper so that it may be laid on the map of the underground workings to show the true relations of the surface features to the mine workings and excavations. It shall show all surface features such as ravines, intermittent and permanent streams, bodies of standing water, county, township and section lines, township and section numbers, town lots, streets and roads, the location of mine openings, the position and names of all buildings, coke ovens, railroad tracks, side tracks, and mine tramways or haulage lines, the boundary lines of the property, the ownership of the contiguous lands, the elevation above mean tide (sea level) of some point, bench mark or permanent monument near the main opening of the mine, and all outcrops of coal seams.

The underground map shall be made on the same scale as the surface map, and shall show the mine openings or excavations, the shafts, slopes, drifts, connections with other mines or workings, or other seams in the same mine, the entries, headings, rooms, pillars, abandoned workings, air ways with darts showing the direction of currents, cross cuts, break-throughs, overcasts, undercasts, doors, permanent stoppings and current regulators, haulageways, partings, switches, trolley and other electric lines such as lighting and machine feed lines, electric distributing stations and transformers, position of pumps, fans, furnaces, stationary hauling engine, engine planes, relighting stations, stationary motors, water lines and fire fighting equipment, telephone lines and station, signal stations, fire boss's cabins, rescue and aid station, fire walls, standing water, dammed back water, oil houses, motor houses, and stables. Each map shall show by a profile drawing or section and measurements, the rise and dip of the seams from the bottom of the shaft or slope to the face of the workings.

Whenever an owner is about to open a new mine, or materially extend the workings or rearrange the plan of operation or ventilation of a mine already opened, he shall make a detailed surface map and a detailed plan of the proposed operation of such mine or extension or rearrangement, and shall submit it to the Chief

Inspector of Coal Mines for his approval, and shall not proceed to the opening of such mine until said plans have been approved by the Chief Inspector of Coal Mines.

Whenever a mine is about to be abandoned, or closed for an indefinite period, the owner shall make a complete, final survey of all parts of such mine and shall properly enter the results upon the maps of the mine and the copies of such maps in possession of the Chief Inspector of Coal Mines, and in the office of the County Recorder, so as to show the exact relations of the most advanced workings to the boundary of the property.

The Chief Inspector of Coal Mines may order a survey to be made of the workings of any mine, or any part thereof, and the results to be extended on the maps and copies of the maps of such mine whenever, in his judgment, the safety of the workings or the support of the surface, requires it. Such survey and extensions shall be made at the expense of the owner.

If the owner 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 the maps or plans as herein required, the Chief Inspector of Coal Mines is hereby authorized to cause a correct map of the actual workings of such coal mine 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 the 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 such coal mine is situated, and in the office of the Chief Inspector of Coal Mines. If the Chief Inspector of Coal Mines shall find, or have reason to believe, that the map or plan furnished by any owner is inaccurate in any material part, he is hereby authorized and directed to cause to be made a correct map or plan of such part or parts as he believes to be inaccurately mapped. If the owner's map or plan proves to be incorrect, said owner shall bear the cost of such remapping, otherwise the costs shall be paid from the Coal Mine Inspection Fund.

Sec. 19. FENCING PILES OF SLACK COAL AND ABANDONED PITS OR SHAFTS.

The owner of any coal mine from which the fine or slack coal is taken and piled upon the surface of the ground in such quantities as may produce spontaneous combustion, shall fence said ground in such manner as to prevent loose cattle or horses from having access to such slack piles. The owners of lands on which there are coal pits or shafts of sufficient depth to endanger the lives of cattle, horses, or other stock, shall fence or fill said pits or shafts in such manner as to afford permanent protection to all stock endangered thereby.

Any owner failing to comply with the provisions of this section shall be deemed guilty of a misdemeanor and shall be punishable by a fine of not less than twenty-five dollars ($25.00)

nor more than one hundred dollars ($100.00) and shall be further liable to any person or persons injured thereby in the amount of the actual injury sustained.

Sec. ELECTRICAL INSPECTOR, ELECTRICAL INSTALLATIONS, AND THE USE OF ELECTRICITY.

The Governor shall appoint on the first day of October, 1911, or within ten days thereafter, three (3) citizens of this State of good repute, to be known as the Examining Board for Electrical Mine Inspectors, whose duty it shall be to examine applicants for the office of electrical inspector of mines of this State. The Chief Inspector of Coal Mines shall be ex-officio chairman of this Board and the other two members shall be, one a mine superintendent, and one an electrical engineer. They shall be at least thirty years of age, and shall have had at least five years' experience in the practice of their respective professions. The chairman of this board shall receive no other compensation than his salary as Chief Inspector of Coal Mines. The other two members of the Examining Board shall each receive the sum of ten ($10) dollars a day for each day actually employed in discharging their duties according to the provisions of this act, and all necessary expenses incurred in performing the duties imposed upon them by this act, payable from the Coal Mine Inspection Fund. Any vacancy that may occur in the membership of the Examining Board shall be filled by the Governor according to the provisions of this act.

The Board after being duly organized shall, before proceeding with its duties, go before any proper officer authorized to administer oaths and each member shall be duly sworn to faithfully perform the duties of his office without fear or favor, taking the following oath which shall be kept on file in the office of the Chief Inspector of Coal Mines.

"We, the undersigned, do solemnly swear (or affirm) that we will perform, to the best of our ability, the duties of examiners of applicants for appointment to the office of electrical inspector of coal mines, and that in judging such applicants we will be governed solely by the evidence of their fitness to perform the duties of electrical inspector of coal mines, as imposed by this act, and that we will refuse to certify all who fail to show proper evidence of their fitness for such duties."

The Examining Board shall be convened by the Chief Inspector of Coal Mine at such time as circumstances may require, for the purpose of examining applicants for the office of electrical inspector of mines, or for preparing questions and formulating rules for conducting examinations, or for performing any other duties made necessary by the provisions of this act.

Every examination shall be publicly advertised throughout the coal mining districts for a period of at least thirty (30) days prior to the date of the examination, and the time and place of

the examination and the conditions of eligibility shall be fully stated in the advertisement.

All applicants for appointment to the position of electrical inspector of mines shall certify to the Examining Board that they are citizens of the State of Colorado; that they are not pecuniarily interested in any of the mines of the State; that they are men of personal integrity, of temperate habits, and of good repute; that they are in good physical condition, and that they are between the ages of thirty (30) and forty-five (45) years. Provided, however, that any person who has served as electrical inspector under this act before reaching the age of forty-five (45) years shall be eligible to re-appointment at the discretion of the Examining Board.

Applicants must further show that they have had at least five years of practical experience in the operation of electrical apparatus devoted to power purposes, at least two years of which must have been in connection with the electrical equipment of coal mines.

The examination shall be in writing and shall be of such a nature as to show that the applicant possesses sufficient theoretical and general practical knowledge of the application of electricity to mining, of the danger attending its use, and the safeguards that should be employed. Each applicant must also show that he possesses a full knowledge of the code of the Underwriters' National Electrical Association, of the rules of the American Institute of Electrical Engineers, and of the rules governing the use of electricity in coal mines as prescribed in this act.

The Examining Board shall grade each applicant according to his merit. In determining the grade, the previous experience and record of service of the applicant together shall have equal weight with the written examination, and only those who receive a grade as high or higher than that previously determined upon by the board shall be eligible to appointment. The examination sheets of all applicants, with the complete list of questions and their correct solutions, shall be kept on file in the office of the Chief Inspector of Coal Mines as public documents. The Examining Board shall certify to the Governor the names and grades of all successful candidates and shall issue to every candidate a statement of the result of his examination.

The Governor shall, from the names certified to him by the Examining Board, appoint an electrical inspector. When appointments are made, those persons standing highest in percentage on the examination shall be given preference over those of lower percentage. Provided, that any person who has not been certified as hereinabove provided within a period of four years, shall not be deemed eligible for a first appointment to the office of electrical inspector of coal mines until he shall have been again examined

and certified by the Examining Board according to the foregoing provisions of this act.

All appointments to the office of electrical inspector of coal mines shall be for a full term of four years, but in case of a vacancy the Governor may commission for the unexpired term the person having the highest grade on the certified list.

The electrical inspector shall receive a salary of two thousand four hundred dollars ($2400.00) per year, and necessary and actual expenses when in the performance of his official duties, payable monthly from the Coal Mine Inspection Fund.

The duties of the electrical inspector shall relate only to the electrical plants, and the use of electricity, in and about the coal mines of the State, and he shall inspect the electrical equipment used in, or in connection with all of the mines of the State as often as possible. Within five (5) days after completing the inspection of a mine, the inspector shall prepare a report setting forth fully the condition of the electrical equipment of said mine, and a copy of this report shall be sent to the office of the Chief Inspector of Coal Mines, where it shall be kept on file as a public document, and another copy shall be sent immediately to the owner of the mine, which report shall be posted by him in a conspicuous place near the workings.

The electrical inspector shall work under the direction of the Chief Inspector of Coal Mines, and shall perform such duties and make such reports from time to time as he may direct.

The electrical inspector shall have the right to enter any mine within his jurisdiction at any time for the purpose of making examinations or obtaining information. In case of accident, resulting directly or indirectly from the use of electrical apparatus in or about the mine, the electrical inspector shall be required to make a full and complete investigation into the nature and cause of the accident. He shall make a full report of every such investigation to the Chief Inspector of Coal Mines.

ELECTRICITY. On and after the first day of October, 1911, the installation of electric plants and the use of electricity in the coal mines of this State, and all modifications or extensions of plants, in use or ready for use, made after that date shall conform, as far as is reasonably practical to the following rules:

DEFINITIONS. The expression "pressure" means the difference of electrical potential between any two conductors through which a supply of energy is given, or between any part of either conductor and earth as read by a volt-meter, and,

(a) Where the conditions of the system are such that the pressure at the terminals where the electricity is generated cannot exceed three hundred volts, this shall be deemed a low pressure system;

(b) Where the conditions of the system are such that the pressure at the terminals where the electricity is generated be-

tween any two conductors, or between one conductor and earth, may at any time exceed three hundred volts, but cannot exceed six hundred volts, this shall be deemed a medium pressure system;

(c) Where the conditions of the system are such that the pressure at the terminals where the electricity is generated between any two conductors, or between one conductor and earth, may at any time exceed six hundred volts, this shall be deemed a high pressure system.

The expression "the minimum" signifies the least reasonably possible to be attained by the proper use of the means from time to time known and available, so as to secure safety with efficiency.

Rule 1. All electrical apparatus and conductors shall be sufficient in size and capacity for the work they may be called upon to do and so installed, worked, maintained, and safeguarded as to reduce the danger from accidental shock or fire or overheating to the minimum, and shall be of such construction and so worked that the rise in temperature caused by ordinary working shall not injure the insulating materials.

In any gaseous part of a mine the covering of motors or cables shall be so constructed that there is no danger of firing gas by sparking or flashing that may occur during the normal or abnormal working of the apparatus.

All metallic coverings or armoring of cables, and the frames and bed-plates of generators, transformers, and motors other than portable motors, shall be efficiently grounded, if the pressure at the terminals where the electricity is used exceeds the limits of low pressure.

Rule 2. Where a medium pressure system is used for power purposes or for arc or incandescent lamps, the conductors that form the connection to the motors, transformers, or lamps or are otherwise used in connection with the system, shall be fixed at such a distance apart or in such a manner that danger from fire or shock shall be reduced to the minimum. This rule shall not apply to trailing cables, which are dealt with under rules twenty-seven to thirty-two.

Rule 3. Motors of coal-cutting and other portable machines shall not be used at a pressure higher than a medium pressure.

Rule 4. Without the approval of the Electrical Inspector, a higher pressure than a medium pressure shall not be used under ground, except for transmission or for application to transformers or other apparatus in which the whole of the high pressure circuit is stationary.

All high pressure machines, apparatus and lines shall be so marked by the use of the word "Danger" at frequent intervals, or by red paint properly renewed when necessary, or in some other conspicuous manner, as to indicate clearly that they are high pressure and dangerous.

Rule 5. In any gaseous part of a mine, a higher pressure than a medium pressure shall not be transmitted beyond the last cut-through of the intake entries, and all motors, transformers, and other apparatus connected with such high pressure system must be placed in suitable chambers, ventilated by intake air.

Rule 6. In every completely insulated circuit, ground detectors shall be kept connected in every generating station, to show immediately any defect in the insulation of the system. These instruments shall be inspected daily by a competent person, or an automatic recording instrument shall be used.

Rule 7. Main and distribution switch boards and fuse boards in the mine shall be made of incombustible insulating material such as marble or slate, free from metallic veins, and be fixed in as dry a place as practicable.

Rule 8. No repairing of the live parts of any electrical apparatus, except cleaning or oiling, shall be done when the current is on.

Where the live parts of switches or machines working at a pressure exceeding the limits of low pressure may have to be handled for the purpose of adjustment, or for such wiping or oiling, insulating gloves or mats of India rubber or other suitable material shall be supplied by the owner and shall be used by the attendants.

Rule 9. At every gaseous mine where electricity is used below ground for power, there shall be employed a competent person, and who shall have full charge of all electrical machinery and apparatus in the mine. A mine electrician or an assistant mine electrician shall be on duty at the mine when the electrical apparatus or machinery in use for the production of coal requires more than one hundred horse power.

Rule 10. Fire buckets filled with clean dry sand shall be kept in the mines where stationary electrical apparatus is located, ready for immediate use.

Rule 11. Instructions shall be posted at the mine entrance and in every generating, transforming, and motor house, for the resuscitation of persons suffering from electric shock. All employees working in connection with the electrical apparatus shall be required to acquaint themselves with these instructions.

Rule 12. A plan on a scale not smaller than two hundred feet to the inch shall be kept at the mine showing the position of all permanent electrical machinery and fixed cables or conductors in the mine, and it shall be corrected as often as may be necessary to keep it as nearly as practicable up to date, and it shall never be more than three months in arrears. Such plans shall, so far as is consistent with this rule, be subject to the same conditions as are provided by Sec. 18 of this act in relation to the plan therein mentioned.

Rule 13. Every personal accident occurring in connection with the operation of electrical equipment shall be promptly reported in the same manner as other accidents.

Rule 14. In the event of a breakdown, or damage or injury to, any portion of electrical equipment in a gaseous mine, or of over-heating or of the appearance of sparks of arcs outside of enclosing casings, or in the event of any portion of the equipment (not being a portion of the electrical circuit) becoming alive, every such occurrence shall be promptly reported to the mine electrician or other person in charge of the electrical equipment.

Rule 15. When the generating station under the control of the owner of the mine is not within five hundred feet of the mine entrance, a switch box, or boxes, efficiently enclosed and locked, or a locked switch house, shall be provided near the mine entrance for cutting off the supply of electricity to the mine.

Rule 16. All terminals and live metal on machines, over medium pressure above the ground and over low pressure under ground, shall, when practicable, be protected with insulating covers or with metal covers connecting to earth.

Rule 17. If the transmission lines from the generating station to the mine are overhead and exceed five hundred feet in length, there shall be well grounded lightning arresters in connection therewith at the mine entrance.

Rule 18. All high pressure wires used inside of the mines shall be in the form of insulated lead covered or armored conductors, subject to insulation tests and with carrying capacity according to the rules of the American Institute of Electrical Engineers. Except in gaseous parts of a mine, all medium or low pressure conductors may be bare, or if insulated it must be with first class insulation. If bare wire is used, all feed wires must be shielded and properly protected at all points where there is danger of men or animals coming into contact with them. In gaseous parts of a mine, no bare conductors shall be used in rooms, in room necks, or in entries inside of the last cut-through.

Rule 19. The size of the conductor (except in the case of overhead wires upon the surface) shall be determined as to heating in accordance with the table showing maximum current for copper conductors, as designated by table prepared by the American Institute of Electrical Engineers.

Rule 20. One side of all grounded circuits must be efficiently insulated from earth.

Where lead-covered or armored cable is used, the lead or armor shall be earthed and shall be electrically continuous throughout.

Rule 21. The exposed ends of cables where they enter the terminals of switches, fuses and other appliances shall be properly protected and finished off, so that moisture cannot creep along the

insulating material within the waterproof sheath, or the insulating material, if of an oily nature, leak out of the cable.

Rule 22. All joints must be mechanically and electrically efficient and, where practicable, must be suitably soldered.

Rule 23. Overhead bare wires on the surface shall be properly secured to insulators and clear of any traffic and provided with lightning arresters.

Rule 24. In any gaseous part of a mine the main cables shall be taken into the mine by way only of an intake airway.

Rule 25. All cables used in shafts must be highly insulated and substantially fixed. Shaft cables not capable of sustaining their own weight shall be properly supported at intervals varying according to the weight of the cable. Where the cables are not completely boxed in and protected from falling material, space shall be left between them and the side of the shaft so that they may yield and thus lessen a blow given by falling material.

Rule 26. Cables in main haulage roads, where persons are hauled into or out of the mines, shall be especially protected.

Cables and wires, unless provided with metallic coverings, shall not be fixed to walls or timbers by means of uninsulated fastenings.

Cables under ground, when suspended, shall be supported flexibly in such a manner as to allow of their readily breaking away when struck, before the cables themselves can be seriously damaged.

When main or other roads are being repaired or blasting is being done, temporary protection must be used so that the cables are protected from damage, and cables must be inspected after such work is completed and before the current is applied.

Rule 27. Trailing cables for portable machines shall be especially flexible, heavily insulated and protected with extra stout braiding hose pipes or other equally effective covering.

Rule 28. The joints, if any, made in trailing cables, shall be soldered. Clamps of any kind must not be used.

Rule 29. The two cables of the twin trailing cable shall be divided at the motor and only for such a length as is necessary for the making of connection to the motor, and the twin cable with its outer covering complete shall be securely held by a suitable clamp on the motor frame in such a manner as to protect the trailing cable from injury and to prevent any mechanical strain being borne by the single ends making electrical connection with the motor.

Rule 30. In the event of the trailing cable in service breaking down, or being damaged in any way, or, of its inflicting a shock upon any person, it shall at once be put out of service, and another cable shall be substituted therefor. The faulty cable shall not be used again until it has been repaired and tested by the mine electrician or other competent person.

Rule 31. In gaseous parts of mines each trailing cable in use shall be examined daily for abrasions and other defects. Each machine man shall also be required to observe carefully the trailing cable while in use, in order to detect defects, and, in the event of any defect becoming apparent, notice of the same shall at once be given to the mine electrician.

Rule 32. The trailing cable shall be kept disconnected from the machine while it is being loaded on to or unloaded from the truck, unless the construction of the machine is such that the electric power is necessary for its unloading or re-loading.

Rule 33. Fuses and automatic circuit-breakers shall be so constructed as to open the circuit when the current through them exceeds by one hundred per cent the working current in the case of motors, or the permissible current of the cables which these devices protect. Fuses shall be stamped or marked or shall have a label attached indicating the current at which they are intended to fuse, or where fuse wire is used, each coil in use shall be so stamped and labeled. Fuses shall be adjusted or replaced only by a competent person authorized by the owner, except in case of coal cutting machines and electric locomotives, when the machine runners and motormen shall be permitted to adjust or replace them.

Rule 34. All switches, circuit-breakers and fuses must have incombustible bases of marble, slate or porcelain or other suitable incombustible insulating material.

Rule 35. All points, at which a circuit (other than those for signals or portable motors) has to be made or broken, shall be fitted with proper switches. In any gaseous part of a mine the use of hooks or other makeshifts is prohibited, and switches, circuit-breakers and fuses (except as provided for in Rule 41 hereafter) shall not be of the open type, but must be either enclosed in gas tight boxes or break under oil.

Rule 36. Every stationary underground motor, together with its starting resistance, shall be protected by a fuse or circuit-breaking device in accordance with Rule 34, and by switches conveniently located near the motor capable of entirely cutting off the pressure.

In any gaseous part of a mine all mining machines with their cables shall be protected against overloads or excessive currents by a completely enclosed and flame-proof fuse.

Rule 37. Where unarmored cables or wires pass through metal frames or into boxes or motor casings, the holes shall be substantially bushed with insulating collars and, where necessary, with gas-tight bushings that cannot readily become displaced.

Rule 38. The terminal of connections or cables for portable motors shall be securely attached to the machine.

Rule 39. When the insulation of a motor is found to become damp during a stoppage, suitable steps shall be taken to insure

that the insulation shall be dry before the working of the motor is resumed.

Rule 40. In any gaseous part of a mine all motors, unless placed in such rooms as are separately ventilated with intake air, shall have all their current-carrying parts, also their switches, starters, terminals and connections, completely enclosed in such manner as to prevent the escape of sparks or flame into the gaseous atmosphere; the enclosures shall be made of incombustible material and of sufficient strength to escape damage in the event of an explosion of fire-damp occurring in the motor, and such enclosures shall not be opened except by an authorized person and then only when the current is switched off. The current shall not be turned on or off while the enclosures are open.

Rule 41. In any gaseous part of a mine a safety lamp or other suitable apparatus for the detection of explosive gas shall be provided for the use of the attendant of stationary electrical apparatus; and should any indication of explosive gas appear on the flame of the safety lamp or other apparatus used, the person in charge shall immediately stop the machine, cut off the current at the nearest switch.

Rule 42. No man shall be placed in charge of a coal-cutting machine who is not a competent person capable of determining the safety of the roof and sides and detecting the presence of explosive gas.

Rule 43. In any gaseous part of a mine, before a coal-cutting machine is brought within twenty yards of the working face, the machine-man shall make an inspection for gas in the place where the machine is to work, unless such an examination is then made by some other competent person authorized or appointed for that purpose by the owner. If any explosive gas is found in the place, the machine shall not be taken therein.

No coal-cutting machine shall be continued in operation for a longer period than half an hour without an examination as above described being made for gas, and if gas is found the current shall at once be switched off the machine and the trailing cable shall forthwith be disconnected from the feed wire.

The person finding the gas shall at once erect a danger signal to warn persons against entering such place. The trailing cable shall be removed from such place, and shall not be brought back, nor shall the machine be again started in such place until the fire-boss or a person duly authorized by the owner has examined it and pronounced it free from gas and has removed the danger sign.

Rule 44. In order that the roof may be carefully examined, no coal cutter motor shall be kept continuously at work for a length of time exceeding half an hour.

Rule 45. The person in charge of a coal cutting or drilling machine shall not leave the machine while it is working, and shall, before leaving the working place, see that the current is

off from the trailing cables. No repairs shall be made to any portable machine until the current has been cut off.

Rule 46. In any gaseous part of a mine where locked safety lamps are used, if any sparks or arcs appear outside the casing of a coal cutter or other portable motor or about the cables or rails the machine shall be stopped and shall not be worked again until the defect has been repaired.

Rule 47. All enclosed motors used under ground shall be opened and inspected by the mine electrician or other competent person at least once a week, and when necessary shall then be cleaned and repaired. Enclosed switches shall be opened and inspected at least once every month.

Rule 48. Electrical haulage by locomotive on the trolley wire system shall not be allowed in any gaseous part of a mine except in intake entries.

Rule 49. In underground roads the trolley wire shall be sufficiently guarded or the current shall be cut off from the wires at all times when such roads are used for traveling ways. The hours during which traveling on foot therein is permitted shall be clearly indicated by notices and signals placed in conspicuous positions at the end of and at all entrances into such roads. At other times no one except a duly authorized person shall be permitted to travel on foot along such roads.

Rule 50. On underground roads, the trolley wire shall be placed as close to the side and as nearly in a straight line as practicable and shall be securely supported at frequent intervals. On any part of the trolley system, where it is necessary for men to cross under the trolley, it shall be so guarded that the possibility of contact will be reduced to a minimum and lights shall be placed at all such crossings. At all landings, turnouts, partings and other places where men are required to work near, or to pass under, the wire, a suitable protection shall be placed. This protection may consist in channeling the roof, in placing along the wire boards which shall extend three inches below the wire, or by the use of other approved devices that afford protection; or the wire may be placed six feet above the top of the rail. All branch trolley lines shall be fitted with an automatic trolley switch or section insulator and line switch, or some other device that will allow the current to be shut off from such branch headings. Lights shall be placed along the branch headings to indicate when the power is one.

Rule 51. Where air or water pipes parallel the grounded return of power circuits, the return shall be securely bonded at frequent intervals to such pipes, to eliminate the possibility of a difference of potential between rails and pipes, and to prevent electrolysis of the pipes. The rail return shall be of sufficient capacity for the current used, independently of the capacity of the pipes.

Rule 52. If storage battery locomotives are employed in any gaseous part of a mine, the rules applying to motors in such places shall also be deemed to apply to the boxes containing the cells.

Rule 53. Small wires for lighting circuits shall be conveyed either in pipes or cases, or they shall be suspended from porcelain insulators or securely tied to them, so that they do not touch any timbering, coal, or metal. On no account shall uninsulated staples be used. If metallic pipes are used, they must be electrically continuous and grounded. If separate uncased wires are used, they shall be kept at least three inches apart and not brought together except at lamps or switches or fittings.

Rule 54. In any gaseous part of a mine, electric lamps, if installed, must be of the vacuum type; they shall be enclosed and protected by gas-tight fittings of strong glass and shall have no flexible cord fittings. Electric lamps shall be replaced by a competent person only.

Rule 55. In any gaseous part of a mine, in all machine rooms and other places underground where a failure of electric light is likely to cause danger, some safety lamps or other proper lights, not fewer than a number to be prescribed for such place by the Deputy Inspector, shall be kept for use in the event of such failure.

Rule 56. Electricity from lighting or power cables shall not be used for firing shots.

Rule 57. When shot-firing cables or wires are used in the vicinity of lighting cables, sufficient precautions shall be taken to prevent the shot-firing cables or wires from coming in contact with the lighting or power cables.

Rule 58. Only such exploders, fuses, and wires shall be used as have been approved by the Electrical Inspector.

Rule 59. High tension magneto-generators shall be enclosed in flame-tight cases when employed in any gaseous part of a mine.

Rule 60. A primary or secondary battery, when used for shot-firing, shall be enclosed in a suitably constructed box fitted with a removable connecting plug or key, without which the circuit cannot be closed. This plug or key shall be be detached when not required for shot-firing and shall not under any conditions pass from the personal custody of the shot-firer while on duty. Such batteries shall be frequently tested by the shot-firer to insure that they give the necessary pressure and current.

Rule 61. The exploder shall be in charge of the shot-firer and shall be fitted with a handle or key, which shall be detached when not required for firing, and shall not under any conditions pass from the personal custody of the shot-firer while on duty.

Rule 62. The exploder shall not be connected to the shot-firing cable until all other steps preparatory to the shot-firing have been completed.

Immediately after the shot-firing, the firing cable shall be disconnected from the exploder and no person shall approach a shot, which has been attempted to be fired by electricity and has failed to explode, until the firing cable has been disconnected and an interval of five minutes has elapsed since the last attempt was made to fire the shot.

The foregoing rules shall not apply to apparatus used for telephone, telegraph, and signal purposes.

Rule 63. All proper precautions must be taken to prevent electric signal wires and telephone wires from coming into contact with other electric conductors, whether insulated or not.

Rule 64. Bells, wires, insulators, contact-makers and other apparatus used in connection with electric signals under ground shall be of substantial and reliable construction and shall be erected in such manner as to reduce to a minimum the liability to failures or false signals.

Rule 65. In any gaseous part of a mine, the pressure employed for signaling purposes shall not in any one circuit exceed fifty volts in an intake airway or twenty volts elsewhere, and bare wires shall not be used for such purposes, except in haulage roads.

Rule 66. If, in any mine safety lamps are relighted under ground by electricity, the mine foreman shall select a suitable station or stations, not in the return airway and where there is not likely to be any accumulation of inflammable gas. No electric relighting apparatus shall be used in any other place. All electric relighting apparatus shall be securely locked and shall not be available for use except by persons authorized by the mine foreman to relight safety lamps, and such persons shall examine all safety lamps brought for relighting before they are re-issued.

Rule 67. Each and every electric plant so installed or so used as to unnecessarily endanger the lives or the safety of the men working in the mine where such plant is operated, shall be so modified and used according to the foregoing rules, that unnecessary danger shall be removed.

Sec. 21. CHILD AND WOMAN LABOR. No person under twelve years of age, and no woman or girl of any age, nor any person under sixteen years of age unless he can read and write the English language shall be employed in any coal mine in this State.

Any owner violating the provisions of this section shall be deemed guilty of a misdemeanor and on conviction shall be punished by a fine of not less than twenty-five dollars ($25.00) nor more than one hundred dollars ($100.00) for each and every offense.

Sec. 22. RIGHT OF SEARCH, AND PENALTY FOR NEGLIGENTLY OR WILFULLY INJURING MINE OR MACHINERY. The owner of any mine or any coal mine Inspector may search or cause to be searched any miner or other employee of a mine, if he has reason to believe that pipes, cigars, cigarettes,

matches, intoxicating liquors or devices for producing fire, except safety or electric lamps, are being carried into the mine.

Any miner, or other person, who shall intentionally injure any shaft, lamp, instrument, air course, or brattice, or obstruct or throw open any air way, or open a door or regulator and not close it again, or carry into or use in a mine pipes, cigarettes, cigars, matches, intoxicating liquors, or any device for producing fire except safety or electric lamps, or disturb any part of the machinery; or enter any part of a mine against caution; or who wilfully neglects or refuses to securely prop the roof of any working place under his control; or unlocks a safety lamp; or disobeys any order given for the purpose of carrying out the provisions this Act; or commits any act whereby the health or safety of the miners and other employees is endangered, or the security of the mines or machinery is harmed, shall be deemed guilty of a misdemeanor and, upon conviction, shall be punished by imprisonment in the county jail for a period of not less than thirty (30) days nor more than one year.

Sec. 23. RIGHT OF ACTION FOR INJURY TO PERSON OR PROPERTY CAUSED BY VIOLATION OF THIS ACT. For any injury to person or property occasioned by any violation of this Act, or any wilful failure to comply with its provisions by any owner of any coal mine, a right of action against the party at fault shall accrue to the party injured for 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 owner of such coal mine shall accrue to the widow and lineal heirs of the person whose life shall have been lost, for like recovery of damages for the injury they shall have sustained.

Sec. 24. SCALES, INSPECTION OF SCALES, WEIGHING OF COAL, CHECK WEIGHMAN. It shall be the duty of every corporation, company or person engaged in the business of mining and selling coal by weight in this State to procure and constantly keep on hand, at the proper place, the necessary scales and whatever else may be necessary to correctly weigh the coal mined and taken out by the workmen or miners, of such corporation, company or persons, and it shall be the duty of the inspector of weights and measures of every county, in which coal is mined and sold, to visit each coal mine operated therein, and once in each year, unless oftener requested by the operator or the miner or the miners, test the correctness of such scales. If in any county there is no inspector of weights and measures, then the deputy inspector of the district in which the mine is located, shall be required to test the correctness of such scales within a reasonable time after application is made therefor by either miners or owner.

All coal mined by weight shall be weighed in the car or other apparatus in which it is removed from the mine before it is screened or before it is passed over or dumped upon any screen or any other device which may let or be capable of letting a por-

tion of the coal drop through such screen or device, and it shall be paid for according to the weight so ascertained at such price per ton as may be agreed upon by such owner and the miner or miners who mine the same.

Hereafter in all coal mines in this State there may be employed a check weighman, who shall be selected by the miners employed in said mine and whose wages shall be paid by the miners therein employed. The duties of such check weighman shall be to see that all coal, mined in the coal mine at which he is employed, is accurately weighed, and for that purpose every such aforesaid owner shall give to such check weighman free access to all scales and weights used for that purpose and to all books wherein the weights of coal mined by the miners of said mines are recorded.

Any mine owner who shall refuse to allow any such check weighman to be so employed or shall refuse such check weighman access to such aforesaid scales, weights or books, shall be deemed guilty of a misdemeanor and upon conviction thereof, shall be fined in the sum of not less than twenty-five dollars ($25.00) nor more than five hundred dollars ($500.00).

Sec. 25. OILS PERMISSIBLE IN COAL MINES. The oiling or greasing of cars inside of the mines is strictly forbidden unless the place where said oil or grease is used is thoroughly cleansed once every day to prevent the accumulation of waste oil or grease on the roads or in the drains at that point. Not more than one barrel of lubricating oil shall be permitted in the mine at any one time. No explosive oil shall be used or taken into the mines for lighting purposes, except when used in approved safety lamps, and oil shall not be stored or taken into the mines in quantity exceeding five gallons. Only pure animal oils, or oils as free from smoke as pure animal oil, shall be used for illuminating purposes in any mine.

Any person selling for use in any mines, or any person using explosive, or impure oil, in any mine, contrary to the provisions of this section shall be guilty of a misdemeanor, and upon conviction shall be punishable by a fine of not less than twenty-five dollars ($25.00) nor more than one hundred dollars ($100.00).

Sec. 26. COAL MINE INSPECTION FUND. All owners of coal mines in this State shall on or before the first day of January, 1912, and on the first day of January of each year thereafter pay into the State Treasury for a coal mine inspection fund, an amount equal to one cent per ton upon the tons of coal produced by such owner during the year ending the previous November thirtieth, which fund shall be used for the purpose of defraying the expenses of the Coal Mine Inspection Department of the State of Colorado.

The State Treasurer shall give duplicate receipts for all moneys thus paid into the State Treasury, one of which shall be delivered to the Chief Inspector of Coal Mines and the other to the owner paying the same.

All expenses of the Coal Mine Inspection Department, including salaries and traveling expenses, shall be paid by the State Treasurer out of moneys in his hands known as the Coal Mine Inspection Fund, on warrants of the Auditor or vouchers drawn on such fund by the Chief Inspector of Coal Mines, and approved by the Governor; but no moneys shall be paid out of the State Treasury in excess of the amount collected from the owners of coal mines as provided in this act.

For all payments made by him the Chief Inspector of Coal Mines shall take proper vouchers. The accounts for all receipts and disbursements made by the Coal Mine Inspection Department shall be audited, adjusted and a report made thereon to the Governor at the close of each year by the Chief Inspector of Coal Mines.

The Treasurer of the State of Colorado shall from time to time transfer from the Coal Mine Inspection Fund to the General Fund such part thereof as shall be in excess of that required for the expenses of the Coal Mine Inspection Department.

Sec. 27. PENALTIES FOR VIOLATION OF THIS ACT NOT OTHERWISE PROVIDED FOR. For the violation of any provisions of this act not covered by specific penalties in the section containing such provisions, the offender shall be punishable by a fine of not less than twenty dollars ($20.00) nor more than two hundred dollars ($200.00) or by imprisonment for a period of not less than thirty days nor more than one year, or both.

Sec. 28. REPEAL. There are hereby repealed all acts or parts of acts, conflicting with the provisions of this Act, provided that, this act shall not be construed as repealing any part of an act or any provisions of former acts relating to coal mines not conflicting herewith.

Sec. 29. TIME TO TAKE EFFECT. This Act shall take effect and be in force on and after the first day of October, 1911, except as otherwise provided therein.

Sec. 30. Should the courts declare any section of this act unconstitutional or unauthorized by law or in conflict with any other section or provision of this act, then such decision shall affect only the section or provision so declared to be unconstitutional and shall not affect any other section or part of this act.

INDEX.

8. Checking In and Out System.
9. Company Inspectors.
10. Daily Record of the Condition of Mines.
11. Notice of Abandonment of Mines of Workings.
12. Explosives.
13. Underground Workings.
14. Ventilation.
15. Telephones, Signals, Lamps.
16. Safety Appliances, Etc.
17. Outlets and Escapement Shafts.
18. Maps.
19. Fencing Piles of Slack Coal.
20. Electricity.
21. Child and Woman Labor.
22. Right of Search, Penalty for Negligently or Willfully Injuring Mine or Machinery.
23. Right of Action for Injury.
24. Scales, Inspection of Scales, Weighing of Coal, Check Weighman.
25. Oil Permissible in Coal Mines.
26. Coal Mine Inspection Fund.
27. Penalties for Violation of Act Not Otherwise Provided For.
28. Repeal.
29. Time to Take Effect.

Directory of Coal Mines

BOULDER

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Simpson	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Mitchell	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Vulcan	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Acme	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Rex No. 1	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Rex No. 2	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Hecla	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Industrial	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Gorham	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Standard	Standard Coal & Land Co., Denver	W. C. Babcock
Monarch No. 1	National Fuel Co., Denver	H. Van Mater, Pres.
Monarch No. 2	National Fuel Co., Denver	H. Van Mater, Pres.
Capitol	Colorado Capitol Coal Co., Denver	
Centennial	Centennial Coal Co., Denver	
Summit	Russell Gates Mining Co., Denver	Russell Gates, Pres.
Nonpareil	Brooks-Harrison Fuel Co., Louisville	
Fox	Fox & Patterson, Denver	
Matchless	Fox, Patterson & Evans, Denver	
Sunnyside	Central Coal & Land Co., Louisville	
Strathmore	Continental Fuel Co., Denver	M. S. Donnelly
New Baker	Flavel, Park & Flavel, Lafayette	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
J. C. Williams.....	Henry Denman	Fan	80,500	C. & S., B. & M. and U. P.....	
J. C. Williams.....	Henry Denman	Fan	30,000	B. & M., U. P.....	
J. C. Williams.....	Henry Denman	Fan	50,800	B. & M., U. P.....	
J. C. Wilson.....	L. G. Wilson	Fan	70,000	C. & S.....	
J. C. Williams.....	Wm. Atkins	Fan	80,000	C. & S.....	
J. C. Williams.....	Thomas Hilton	Fan	20,000	C. & S.....	
J. C. Williams.....	N. Hodgson	Fan	35,000	C. & S.....	
J. C. Williams.	F. L. J. MacCormac	Fan	25,000	C. & S.....	
J. C. Williams.....	Geo. Giles	Fan	45,000	C. & S.....	
.....	D. M. Sultz	Fan	80,000	B. & M.....	
Joseph Watson.....	Ira D. Zook	Fan	54,000	C. & S.....	
Joseph Watson....	Joseph Cochrane	Fan	18,000	C. & S.....	
.....	Geo. Gulley	Fan	70,000	C. & S., B. & M	
.....	S. S. Barrett	Fan	30,000	B. & M.....	
.....	D. W. Morris	Fan	14,000	C. & S.....	
.....	J. E. Brooks	Fan	14,300	C. & S.....	
.....	John Schultz	Fan	28,000	C. & S.....	
.....		Fan	16,000	C. & S.....	
.....		Fan	9,000	C. & S., B. & M.....	
.....		Fan	.....	C. & S.....Shut down indefinitely	
....		Fan	.....	.....	

DELTA

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
King	Juanita Coal & Coke Co., Bowie	Alexander Bowie
Paonia (Farmers)	Paonia Coal Co., Paonia	A. L. Binford
Black Diamond	The Cowan Coal Co., Paonia	
Cedaredge	Surface Creek Co-Operative Coal Co., Cedaredge	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
.....	John S. Bowie	Furnace		D. & R. G.	.....
....		.....		None	.....New mine
.....	Chas. Cowan, Jr.	Air tunnel		None	.....New mine
....	A. W. Hall	Natural		None	.....New mine

EL PASO

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Curtis	Curtis Coal Mining Co., Colorado Springs	C. H. Curtis, Pres.
Rapson No. 2	Rapson Coal Mining Co., Colorado Springs	C. H. Curtis, Pres.
Pikeview	Pike's Peak Fuel Co., Colorado Springs	L. L. Aitken
Danville	Pike's Peak Fuel Co., Colorado Springs	L. L. Aitken
Patterson	Alexander Patterson, Colorado Springs	
Austin Bluffs or Keystone	Keystone Fuel Co., Colorado Springs	
Franceville	Joseph M. Cell, Fountain	
Last Chance	James Dougherty, Colorado Springs	
Neer	H. B. Neff, Colorado Springs	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
.....	Ralph Wooden	Fan	25,000	S. F.	.....
.....	Ralph Wooden	Fan	32,000	R. I.	.....
.....	P. L. Dixon	Fan	.....	D. & R. G.	.....
.....	James Comisky	Fan	30,000	S. F.	.....
.....	Geo. Patterson	Fan	25,000	None	.....
.....	W. S. Cook	Natural	.....	None	.....
.....	J. M. Cell	Natural	.....	None	.....
.....	.....	Natural	.....	None	.....
.....	.....	Natural	.....	None..Idle during 1910	

FREMONT

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Rockvale	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Coal Creek	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Fremont	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Brookside	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Chandler	Victor-American Fuel Co., Denver	W. J. Murray
Radiant	Victor-American Fuel Co., Denver	W. J. Murray
Magnet	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
Emerald	Williamsburg Slope Coal Co., Williamsburg	
Central	Colorado Central Coal & Mining Co., Colorado Springs	
Williamsburg Slope	Donnelly Coal Co., Florence	
Willie	Samuel Petry, Florence	
Diamond	Diamond Coal Mining Co., Radiant	
Norton	Colorado Colliery Co. Denver	
Royal Gorge	Royal Gorge Coal & Fire Clay Co., Canon City	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
Joe Ball	Henry John	Fan	63,000	S. F.	
Joe Ball	Ben Beach	Fan	15,400	D. & R. G.	
Joe Ball	David Griffiths	Fan	15,400	D. & R. G.	
Joe Ball		Fan	24,000	S. F.	
	G. W. Williams	Fan	23,000	S. F.	
	E. W. Jones	Furnace	25,500	S. F.	New mine
	James McCartney	Fan	18,000	S. F.	
	H. J. Smith	2 furnaces	6,500	S. F.	
	Thos. Knowles	Fan and blowers		S. F.	
	Henry Donnelly	Natural	6,000	S. F.	
		Air tunnel	2,225	None	
				None	Idle during 1910
		Fan		D. & R. G.	Idle during 1910
		Natural		S. F.	Idle during 1910

GARFIELD

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Midland	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
Keystone	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
Vulcan	Coryell Mine Leasing Co., Denver	J. W. Cummins
Coryell	Coryell Mine Leasing Co., Denver	J. W. Cummins
South Canon	South Canon Coal Co., Denver	W. B. Lewis
Diamond	Cardiff Coal Co., Cardiff	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
...	J. W. Allen	Fan	15,000	C. M.	
		Natural		C. M. and D & R. G.	Idle during 1910
	Chas. A. Meerdink	Blower		C. M.	New mine
		Fan	25,000	C. M.	
	R. C. Jones	Fan	7,200	C. M.	
	D. W. Mansfield	Fan	6,000	C. M.	

GUNNISON

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Somerset	Utah Fuel Co., Salt Lake City, Utah	H. G. Williams
Crested Butte	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Floresta	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Alpine	Rocky Mountain Fuel Co., Denver	E. E. Shumway
Kubler	Rocky Mountain Fuel Co., Denver	E. E. Shumway
Porter	Littell Coal & Mining Co., Colorado Springs	H. L. Littell
Horace	Pueblo Fuel & Mining Co., Colorado Springs	H. L. Littell
Bulkley	Crested Butte Coal Co., Denver	Frank Bulkley, Pres.

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
W. B. Williams	R. M. Magraw	Fan	165,000	D. & R. G.	P. O. Address, Somerset, Colo.
J. P. Thomas	Robt. McAllister	Fan	78,000	D. & R. G.	
J. P. Thomas	Robt. McAllister	Fan	44,000	D. & R. G.	
	John Featherston	Fan	30,000	C. & S.	
		Furnace		C. & S.	Closed November, 1910
	C. C. Fridley	Fan		D. & R. G.	
	D. E. Warren	Fan		D. & R. G.	Name of mine changed from Silver Brook to Horace.
	John Buchanan	Fan		D. & R. G.	

HUERFANO

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Robinson	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Rouse	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Walsen	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Pictou	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Hezron	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Cameron	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Ideal	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Midway	Chicosa Fuel Co., Lester	
Maitland	Victor-American Fuel Co., Denver	W. J. Murray..
Ravenwood	Victor-American Fuel Co., Denver	W. J. Murray..
Oakdale	Oakdale Coal Co., Oakview	J. D. Jones
Pryor	Union Coal & Coke Co., Denver	J. W. Bowen, Pres.
Champion	Union Coal & Coke Co., Denver	J. W. Bowen, Pres.
Rugby	Rugby Fuel Co.. Denver	Geo. D. Kimball
Toltec	Northern Coal & Coke Co., Denver	J. D. Skinner, Pres.
Pinon	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
Huerfano	Huerfano Coal Co., Denver	S. S. Murphy, Pres.
Big Four	Big Four Coal & Coke Co., Tioga	
Round Oak	Alliance Coal Co., Denver	
Tioga	The Minnequa Coal Co., Tioga	
Sunnyside	Sunnyside Coal Mining Co., Denver	M. W. Strong, Pres.
Gordon	Gordon Coal Co., Walsenburg	
Beacon	Beacon Mining Co., Strong	
Black Canon	New Maitland Coal Co., Walsenburg	
Bunker Hill	Bunker Hill Coal Co., Rouse	
Caddell	Caddell & Sons, Walsenburg	
Sweet	Silver State Coal Co.. Mayne	
Rockland	Walsenburg Fuel Co., Denver	Frank Bulkley, Pres.
Globe	National Fuel Co., Denver	H. Van Mater
Turner	Robert Turner, Strong	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
Joe Ball	R. K. Graham	Fan	48,800	D. & R. G.	
Joe Ball	W. G. Deck	Fan	33,600	D. & R. G.	
Joe Ball	R. K. Graham	Fan	40,800	D. & R. G.	
Joe Ball	Wm. Manley	Fan	61,650	D. & R. G.	
Joe Ball	J. D. McGowan	Fan	39,600	D. & R. G.	
Joe Ball	T. P. Davis	Fan	23,600	C. & S.. D. & R. G.	
	Jas. Wilson	Furnace	5,000	C. & S.	New mine
	W. G. Deck	Fan		D. & R. G.	Midway mine was taken over by the Colorado Fuel & Iron Co., Jan. 1, 1911.
	John Shaw	Fan	72,000	D. & R. G.	
	John Neish	Furnace	9,300	C. & S.	
	D. W. Jones	Fan	22,500	D. & R. G.	
	Chas. Benchat	Fan		C. & S.. D. & R. G.	
	Robert Young	Air from Maitland mine		D. & R. G.	
	J. H. Dunmire	Fan	15,058	C. & S.. D. & R. G.	
	Leased by Fruith & Autrey	Fan	36,000	C. & S.. D. & R. G.	
	Wm. Forrester	Fan	42,800	C. & S.. D. & R. G.	
	R. F. Pali	Fan	22,320	C. & S.	
	Jas. Mathews	Fan	26,000	C. & S. and D. & R. G.	
	Jas. McDowell	Furnace		C. & S.	
	J. H. Vincent	Fan	30,000	D. & R. G.	
	James Handweight	Fan		C. & S. and D. & R. G.	
	H. J. Elliott	Fan	13,000	C. & S.. D. & R. G.	
	Robt. Locke	Furnace	5,000	C. & S. and D. & R. G	New mine
	Sam Dunford	Furnace	10,000	D. & R. G.	New mine
	I. M. Brennan	Furnace	14,400	D. & R. G.	New mine
	Ed. Caddell, Jr.	Fan		D. & R. G.	
					Closed down
		Fan		D. & R. G.	New mine
Joseph Watson		Steam jet (Furnace)		C. & S.	New mine
					New mine

JACKSON

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Coalmont	Northern Colorado Coal Co., Hebron	.....

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute		Railroad Connections	Remarks
Stewart Kennedy		Natural	.....	.....	None	New mine

JEFFERSON

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Leyden	Leyden Coal Co.. Denver	S. M. Perry
White Ash	Rooney White Ash Coal Co., Morrison	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
J. G. Perry	F. Newmeyer	Fan	53,000	D. N. W. & P.	
W. B. House				Inter-Mountain	New mine

LAS ANIMAS

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Berwind	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Starkville	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Morley	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Sopris	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Frederick	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Tabasco	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Primero	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Tercio	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Engle	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Delagua	Victor-American Fuel Co., Denver	W. J. Murray
Hastings	Victor-American Fuel Co., Denver	W. J. Murray
Gray Creek	Victor-American Fuel Co., Denver	W. J. Murray
Bowen	Victor-American Fuel Co., Denver	W. J. Murray
Cass	Victor-American Fuel Co., Denver	W. J. Murray
Cokedale	Carbon Coal & Coke Co., Cokedale	Frank Guiterman
Piedmont	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
La Belle	Rocky Mountain Fuel Co., Denver	E. E. Shumway, Pres.
Majestic	National Fuel Co., Denver	E. E. Shumway, Pres.
Beacon (Green Canon)	National Fuel Co., Denver	H. Van Mater
Thor (Suffield)	National Fuel Co., Denver	H. Van Mater
Greenville	Cedar Hill Coal & Coke Co., Denver	D. M. Harrington, V.-P.
Toller	Cedar Hill Coal & Coke Co., Denver	D. M. Harrington, V.-P.
Black Diamond	Cedar Hill Coal & Coke Co., Denver	D. M. Harrington, V.-P.
Forbes	Chicosa Fuel Co., Trinidad	Joseph Cox
Kenneth	Chicosa Fuel Co., Trinidad	Joseph Cox
Ludlow	Huerfano Coal Co., Denver	S. S. Murphy
Primrose	Primrose Coal Co., Rugby	
Brodhead	Las Animas Coal Co., Denver	E. L. Prentiss, Pres.
Rapson No. 1	Rapson Coal Mining Co., Colorado Springs	C. H. Curtis, Pres.
Empire	Northern Coal & Coke Co.	J. D. Skinner
Peerless	Aguilar Coal Mining Co., Aguilar	
Thompson (Valley)	Maitland Coal & Coke Co., Denver	
Congo	Congo Coal Mining Co., Colo. Spgs	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
J. S. Thompson	W. J. Davis	Fan	43,200	C. & S.	
J. S. Thompson	Jas. Wilson	Fan	16,240	A., T. & S. F.	
J. S. Thompson	J. R. Jenkins	Furnace	39,450	A., T. & S. F.	
J. S. Thompson	Chas. Chambers	Fan	44,000	C. & S. and C. & W.	
J. S. Thompson	Anthony Musgrove	Fan	47,600	C. & W.	
J. S. Thompson	Joseph Haske	Fan	18,600	C. & S.	
J. S. Thompson	Chas. O'Neil	Fan	94,150	C. & W.	
J. S. Thompson	R. Bickerton	Fan	13,160	C. & W.	
J. S. Thompson	A. H. Robinson	Fan	28,000	D. & R. G.	
	B. W. Snodgrass	Fan	50,400	S. F., D. & R. G. and C. & S.	
	James Cameron	Fan	95,200	S. F., D. & R. G. and C. & S.	
	Thos. Jolly	Fan	28,000	C. & S.	La Belle closed July, 1910
	A. Young	Fan	41,800	C. & S.	
				S. F., D. & R. G.	New mine
	F. P. Bayles	Fan	38,000	C. & S., D. & R. G. and S. F.	
	Wm. Morgan	Fan	28,000	C. & S., D. & R. G.	
		Furnace	63,000	C. & S.	
	Henry Dalby	Fan	18,900	C. & S.	
Joseph Watson	J. R. Dalby	Fan	20,000	C. & S., D. & R. G.	
Joseph Watson	Wm. Watson	Fan	39,000	C. & S., D. & R. G.	
David Davis	E. E. Sherfick	Fan and Furnace	50,000	C. & S., D. & R. G.	
David Davis	H. F. Tennant	Fan	25,200	C. & S., D. & R. G.	
David Davis	Wm. Tweedale	Fan	20,300	C. & S., D. & R. G.	
	Henry Smith	Fan and furnace	14,400	C. & S.	
	Robert Nichol	Furnace	12,800	C. & S.	
	D. McDermott	Fan	25,000	C. & S.	
	Robert Wyper	Fan	30,000	C. & S.	
	W. McBurt	Fan	20,000	C. & S.	
	Ralph Wooden	Fan	10,000	C. & S., D. & R. G.	
Leased to the Empire Coal Co.	Wm. Waddell	Fan	22,260	C. & S., D. & R. G.	
	Geo. M. Tombling	Furnace	6,000	C. & S.	New mine
		Furnace		C. & S., D. & R. G.	New mine; name of mine changed to Burnwell.
	J. Dickson				New mine

LAS ANIMAS

Name of Mine	Name and Address of Operator	Pres. or Gen'l Mgr.
Bloom	Jeffreys Coal & Mining Co., Trinidad	A. G. Jeffryes
Wootton	Wootton Land & Fuel Co., Wootton	
Turner	Wootton Land & Fuel Co., Wootton	
Baldy	Baldy Coal Co., Trinidad	
Stevens	J. J. J. Abercrombie, Trinidad	
Southwestern	Southwestern Fuel Co., Aguilar	
McLaughlin	McLaughlin Bros.' Coal Co., Trinidad	
Alta	A. Brodhead, Brodhead	
Jewel	Ideal Fuel Co., Lynn	

COUNTY—Concluded.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
... .		Natural	.....	Wagon haul	.....
.....		Furnace	8,000	S. F.	.....
.....		Furnace	9,500	S. F.	New mine
.....	Edgar Sherman	Blower	.....	None	.....
.....		Natural	.....	Wagon	Mine closed May 1, 1910
.....	J. W. Siple	Fan	10,000	C. & S.	.....
.....	Thos. M. McLaughlin	Natural	600	S. F.	New mine
.....		.....	.....	C. & S.	New mine
.....		Furnace	.....	C. & S.	New mine

LA PLATA

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Perin's Peak	Calumet Fuel Co., Durango	A. H. Cowie
Hesperus	Porter Fuel Co., Durango	
City	Royal Coal & Coke Co., Durango	
San Juan	Carbon Coal & Coke Co., Durango	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
.....	L. McCormick	Fan	14,400	R. G. S.....	
....	W. I. Gifford	Fan	19,359	R. G. S.....	
.....	Geo. C. Logan	Air shaft ...	6,000	D. & R. G.....	
....	F. C. Gilbert	Furnace	10,000	R. G. S.....	New mine

MESA

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Cameo	Grand Junction Mining & Fuel Co., Grand Junction	John McNeil
Book Cliff	Book Cliff R. R. Co., Grand Junction	W. S. Phillips
Palisade	Palisade Coal & Supply Co., Palisade	
Garfield	Garfield Coal Mining Co., Grand Junction	A. E. Baylis
P. V.	P. V. Coal Co., Cameo	
Stokes	Walter Stokes, Palisade	
Grandview	F. F. De Rush, Palisade	
Wearing	R. H. Moss, Fruita	
Winger	New Grand Mesa Coal Co., Palisade	

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
.....	John McNeil, Jr.	Fan	40,000	D. & R. G.....	
.....	T. E. Sanford	Natural	.....	Book Cliff.....	
.....	Fred Rowley	Natural	.....	C. M. and D. & R. G.....	
.....	.....	Air course..	.....	None direct.....	
.....	H. Mallot	Natural	1,640	C. M. and D. & R. G.....	
.....	Walter Stokes	Natural	.....	C. M. and D. & R. G.....	
.....	F. F. De Rush	Natural	.....	C. M. and D. & R. G.....	
.....	C. Hicks	Natural	.....	None	
.....	.....	Natural	.....	C. M. and D. & R. G.....	

PITKIN

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Spring Gulch	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel
Marion	Colorado Fuel & Iron Co., Pueblo	E. H. Weitzel

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
J. P. Thomas	R. Malloy	Fan	24,000	C. M	
J. P. Thomas	R. Malloy	Natural	16,000	C. M	

ROUTT

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Oak Hills	Oak Hills Coal Co., Denver	S. M. Perry
Pinnacle	Routt County Fuel Co., Denver	E. L. Prentiss, Pres.
Juniper	Juniper Coal Co., Oak Creek	F. A. Craise, Pres.
James	W. J. Schnessler, Oak Creek	
McKinley	Yampa Valley Coal Co., Oak Creek	
No. One	Junction City Coal Co.	W. J. Schuessler

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
J. G. Perry	John D. Morgan	Fan	60,000	D. N. W. & P.	
	Geo. Morrison	Furnace		D. N. W. & P.	
	J. S. Miller	Furnace	9,000	D. N. W. & P.	
		Natural	3,600	D. N. W. & P.	(New mine); closed in June, 1910.
E. S. McKinley		Natural		Two Mile Wagon Haul	New mine
		Natural		D. N. W. & P.	New mine

WELD

Name of Mine	Name and Address of Operator	Pres. or Gen'l. Mgr.
Puritan	National Fuel Co., Denver	H. Van Mater
Parkdale	National Fuel Co., Denver	H. Van Mater
Lehigh	Northern Coal & Coke Co., Denver.	J. D. Skinner
Golden Ash (Baum)	Consolidated Coal & Coke Co., Denver	C. L. Baum
Frederick	Frederick Coal Co., Denver	D. M. Simpson
Evans	Evans Coal & Land Co., Frederick	D. E. Evans
Ideal	Ideal Coal Co., Erie	
Warwick	Warwick Coal & Investment Co.	
Shamrock	Shamrock Coal Co., Erie	
Firestone	Firestone Coal Co., Firestone	
Washington	David Brimble, Erie	
Andrew	State Coal Co., Denver	T. H. Andrew

COUNTY.

General Supt. or Division Supt.	Local Supt.	Mode of Ventilation	Volume of Air in Cubic Ft. per Minute	Railroad Connections	Remarks
Joseph Watson	John Webb	Fan	42,660	U. P.	
Joseph Watson	James Etchells	Fan	26,000	B. M.	
J. C. Williams	Henry Darman	Fan	24,000	U. P.	
	C. W. Smith	Fan	100,000	U. P.	
	Evan Jones	Fan	30,000	U. P.	
	Wm. Fox	Fan	20,000	U. P.	
	Phineas D. Woolley	Fan		None	
	Ernest Whiles	Fan		U. P.	
	Thos. P. Morgan	Fan	3,200	None	
	C. S. Buchanan	Exhaust, steam		None	
	David Brimble	Fan		U. P.	
		Air shaft		None	New mine

INDEX

INDEX