

FINAL REPORT ON EXPLOSION
KENILWORTH MINE, INDEPENDENT COAL & COKE COMPANY
KENILWORTH, CARBON COUNTY, UTAH
MARCH 14, 1945

By
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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INTRODUCTION

A coal-dust explosion occurred at the Kenilworth mine, Independent Coal & Coke Company, Kenilworth, Carbon County, Utah, at 1:15 p.m. March 14, 1945. Twelve men were severely burned, 7 of whom later died. Because of the well-rock-dusted condition of the mine the explosion was localized, and the 12 injured employees, after receiving first-aid assistance, and 156 other employees were able to make their way to the surface without further difficulty.

The explosion, apparently, was caused by the ignition of a large amount of coal dust thrown into suspension by a severe bounce, or bump, in the pillar at the inside end of 5 panel, 3 east entry off 2 slope. Indications are that the source of the ignition was an electric arc from a short-circuited trailing cable which had been pulled from a mobile loading machine by the force of the coal thrown from the pillar.

The first information of the explosion received by the Bureau of Mines was a telephone call about 7:45 a.m., March 15, 1945, from Mr. Paul Keyser, president of the company, to Mr. R. D. Reeder, acting supervising engineer, Salt Lake City Station.

Mr. W. B. Odendahl, coal-mine inspector, and Mr. H. J. McCreary, safety instructor of the Bureau of Mines arrived at the Kenilworth mine at 1:30 p.m., March 15, 1945, and immediately went underground accompanied by Mr. S. C. Harvey, State coal mine inspector, and company officials. Little physical damage had been done by the explosion; all men were out of the mine and the ventilation had been reestablished before the representatives of the Bureau of Mines had arrived.

GENERAL INFORMATION

The Kenilworth mine at Kenilworth, Carbon County, Utah, is served by a branch line of the Denver & Rio Grande Western Railroad and is operated by the Independent Coal & Coke Company of Salt Lake City, Utah.

The names and addresses of the operating officials are:

Paul Keyser	President	Salt Lake City, Utah
G. B. Jackson	Superintendent	Kenilworth, Utah
E. O. Jackson	General Mine Foreman	Kenilworth, Utah
S. F. Fratto	Safety Engineer	Kenilworth, Utah
R. S. Robbins	Chief Engineer	Kenilworth, Utah

The total number of employees at the mine was 450, and of this number 296 work underground on 2 shifts. The daily production during the month of

February 1945 averaged 3,682 tons of coal. The life of the mine is estimated to be about 100 years. The mine openings include three rock tunnels, a timbered slope, a concreted fan drift, and a timber-lined opening from a lower coal bed. All of the active workings are in the Kenilworth coal bed which ranges from 14 to 18 feet in thickness and dips about 5 degrees in a northerly direction.

The immediate roof is sandstone about 4 feet in thickness which is overlain by the massive sandstone which forms the main roof. The maximum cover exceeds 1,500 feet. The floor is hard smooth sandstone.

The coal bed is relatively free from impurities. A sample of coal collected in this mine on January 26, 1940, by J. McKim, U. S. Geological Survey, was analyzed by the Bureau of Mines. The analysis follows:

	<u>Percent</u>
Moisture.....	4.4
Volatile matter..	39.4
Fixed carbon.....	51.3
Ash.....	4.9
	<u>100.0</u>

B.t.u..... 13,130

The ratio of the volatile matter to the total combustible calculated from figures in the above analysis is 0.434 which indicates that the coal dust in the mine is highly explosive when in a dust cloud in air.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Methods of Mining

The main haulageway is a rock tunnel 8,100 feet long driven on a slight raise from the surface to intersect the coal beds. The room-and-pillar method of mining is followed. Main entries are driven on the strike of the coal bed in sets of three or four from which entries, also in sets of three or four, are driven to the raise and dip. Side entries are driven in pairs and in sets of three, 14 feet wide on 75-foot centers, at intervals of 425 feet. The distance between crosscuts is 125 feet.

Panels are driven parallel to the side entries and on the strike of the coal bed. Room slants, quartering the pitch, are driven on 150-foot centers. Panels and rooms are driven 18 to 22 feet wide.

Pillars are extracted on the retreat by the sequent splitting of the pillars, and it is estimated that 85 percent of the coal is recovered.

The coal is loaded by caterpillar and track-mounted loaders and by shaking conveyors equipped with duckbills.

Ventilation and Gases

The mine is ventilated by means of two well-installed centrifugal fans which were exhausting 244,165 cubic feet of air a minute from the mine at water-gage pressures of 1.0 and 2.0 inches at the time of the last Federal coal-mine inspection. The fans were offset from the direct line of the mine openings and were equipped with recording pressure gages, explosion doors, reversing doors, and signal devices to warn of the excessive heating of the fan motors and of the slowing of the fan speed. The fans are operated continuously and are inspected daily by the fire bosses.

A split system of ventilation, with five main splits, is used. The ventilating currents are controlled by incombustible stoppings and overcasts on main entries and by brattice cloth stoppings and line brattices in the working sections. Air-locked wooden doors are used in some of the haulageways and single automatic check doors (erected in halves) are used near the face regions.

The mine is rated as gassy by the Safety Division of the Industrial Commission of Utah. At the time of the last Federal inspection the mine was liberating 858,609 cubic feet of methane in 24 hours. Preshift examinations are made of the mine by fire bosses whose record shows that methane was detected on 6 days during the first 14 days of March 1945.

The analyses of air samples collected during the last Federal inspection are given in table 1, which show the general condition of the mine air at that time. It will be noted that the mine air contained more than 20 percent oxygen and less than 0.50 percent carbon dioxide, also, considerable quantities of methane were being liberated from all parts of the mine.

TABLE 1. - Analyses of Air Samples Collected
October 2-7, 1944

Bottle No.	Sample	CO ₂	O ₂	CH ₄	N ₂	Cubic Feet Air A Minute	Cubic Feet Methane in 24 Hours
137-T	Inby No. 2 fan.....	0.21	20.35	0.31	79.12	98,115	437,985
166-J	Inby No. 1 fan.....	0.25	20.53	0.20	79.02	146,050	420,624
133-J	Regulator, 2 raise back	0.20	20.59	0.16	79.05	34,656	79,847
155-V	Between 2 and 3 parting, main east back entry...	0.12	20.77	0.31	78.80	50,150	223,959
165-0	Breakthrough 13 room, 2 east, 3 raise.....	0.21	20.76	0.07	78.96	No reading	
220	Face, 1 panel, 1 west, 4 raise.....	0.16	20.57	0.87	78.40	Still	
221	Breakthrough between 2 panel and 6 room, 1 east, 4 raise.....	0.10	20.72	0.41	78.77	10,530	62,169
310	Slope overcast, 4 raise	0.12	20.56	0.54	78.78	43,370	337,245
311	No. 4 raise above 5 east	0.29	20.78	0.06	78.87	No reading	
849	In shaft at No. 2 fan..	0.20	20.64	0.00	79.16	No reading	
850	At regulator at back 5 east, 3 raise.....	0.11	20.58	0.20	79.11	22,160	63,820

Auxiliary blower fans, reportedly, were used at the time of the October 1944 inspection; however, at the time of the explosion the auxiliary fans had been removed from the mine.

No oil or gas wells penetrated the strata in the region of this mine.

Dust

The mine is naturally very dry.

During the October 1944 Federal inspection, relatively little dust was in suspension in the conveyor section; however, extremely dusty conditions prevailed in the pillar districts during the operations of cutting and loading. The extreme dusty conditions offered hazards from poor visibility and the possibility of a dust or dust-and-methane ignition.

Water was used to allay the coal dust at its source while cutting, on the coal pile while loading, at the faces before and after blasting, and on loaded trips during haulage. Fog nozzles are now used on several of the loading machines to allay the dust and a great improvement was noted in the reduction of the amount of dust in suspension; however, all of the cutting and loading machines in the pillar sections had not been equipped with fog nozzles. Officials of the company stated that additional fog nozzles had been ordered for these machines.

Some coal was not cleaned up during the loading operations by the mobile loaders and as is usual in coal mines, considerable fine coal and coal dust are left on the floor; the haulageways are kept clean. The mine cars are fairly tight and are not loaded so as to cause spillage.

The mine has been rock dusted in rooms, trackless entries, and haulageways. A regular schedule of rock dusting has been adopted for the mine and according to the company's records, during the year 1944 the amount of rock dust applied was equal to 2.7 pounds for each ton of coal mined, and 4.7 pounds of rock dust was applied for each ton of coal mined during the first two months of 1945.

A number of dust samples were collected during the last Federal inspection. The analyses of the dust given in table 2 show the generally well-rock dusted condition of the mine at that time. The dust in the explosion area is represented by samples G-103 and M-144, the analyses of which show they contain 92.9 and 89.8 percent incombustible. It should be noted that during recent months the quantity of rock dust applied to the mine had been increased from the 1944 rate of 2.7 pounds of rock dust for each ton of coal mined to the rate of 4.7 pounds of rock dust for each ton of coal.

Haulage and Lighting

The main haulage is by means of trolley locomotive. Secondary haulage is by rope and by electric locomotives, and the gathering haulage is by cable-reel-trolley locomotives. The haulage roads are ventilated by intake air.

TABLE 2. - Analyses of Dust Samples Collected
October 2 - 7, 1944

Can No.	Location in Mine	Kind of Sample	Percent		
			Combustible Volatile Matter plus Fixed Carbon	Incombustible Moisture plus Ash	Through 20-Mesh
Q-61	Midway between 1 and 2	Rib and Roof	10.5	89.5	92.6
B-891	east on 4 raise slope	Road	34.4	65.6	81.6
J-22	Midway between 2 and 3	Rib and Roof	12.0	88.0	91.6
F-865	east, 3 raise slope	Road	54.6	45.4	74.1
Q-782	9 room on 2 east,	Rib and Roof	12.1	87.9	94.3
M-44	3 raise	Road	17.0	83.0	87.5
G-103	3 east, 2 slope	Rib and Roof	7.1	92.9	96.9
M-144	3 east, 2 slope	Road	10.2	89.8	90.6

The haulage roads and haulage equipment are well maintained. Permissible trip lights are used on the rear of all trips, and incandescent electric lamps are installed at frequent intervals to illuminate the haulageways. Fixed electric lights are provided at all stations except those in the face regions.

The underground employees use permissible electric cap lamps for portable illumination. Permissible flame safety lamps are used for gas testing by the foreman, fire bosses, shot firers, and machine men. Foremen, fire bosses and shot firers are certified by the State of Utah. The flame safety lamps used by the noncertified employees are inspected each shift by certified officials before the lamps are taken into the mine.

Smoking in the mine is forbidden, and the employees apparently conform to this rule.

Electrical Equipment Underground

The electrical equipment used underground is of open, explosion-proof, and permissible types. With the exception of the 5 open-type shortwall cutting machines, explosion-proof and permissible types of electrical equipment are used in the face regions. A list of the underground electrical equipment follows:

- 7 Track-mounted cutters with mounted drills - Permissible.
- 5 Shortwall cutting machines - Open.
- 2 Shortwall cutting machines - Permissible.
- 4 Caterpillar loading machines - Explosion-proof.
- 3 Track-mounted loading machines - Permissible.
- 7 Motor generator sets - 2,300-volt synchronous motors 275-volt D.C. generators 25 to 200 kw. capacity - Open.
- 4 2,300-volt AC hoists - 200 horsepower - Open.
- 1 220-volt AC hoist - 50 horsepower - Open.
- 1 7-1/2-horsepower - D.C. hoist - Permissible.
- 3 High-pressure rock-dust distributors - Permissible.

- 2 Small rock-dust distributors - Permissible.
- 8 Shaking conveyors equipped with duckbill units - Permissible.
- 6 6-ton locomotives - cable-reel - Open.
- 7 8-ton cable-reel locomotives - Open.
- 5 10-ton cable-reel locomotives - Open.
- 1 10-ton trolley locomotive - Open.
- 4 15-ton trolley locomotives - Open.
- 2 8-ton battery locomotives - Permissible.
- 12 Hand-held coal drills - Permissible.
- 11 Post-mounted coal drills - Permissible.
- 4 Post-mounted coal drills - Open. (Not used at face).
- 1 AC pump - 40 horsepower - Open.
- 14 AC pumps - 10 horsepower and less - Open.
- 9 DC pumps - 10 horsepower and less - Open.
- 1 DC portable compressor
- 18 Sectionalizing and stub and breakers - Open.

The equipment is regularly inspected by an electrical inspector and is maintained in good condition from a mechanical standpoint; however, at the time of the last Federal inspection some of the equipment was not maintained in a permissible or an explosion-proof condition; and during this investigation the loading machine in the explosion area had a broken light lens and a bolt missing from a cable manifold, while the loading machine in the 3 east, 3 raise district had packing glands missing at the cable inlets. These conditions offered explosion hazards from a possible accumulation of methane in explosive mixtures.

The power lines are well installed in intake airways. The trailing cables are spliced underground by the repairmen. The splices appeared to be well made, but, probably because of war conditions, they are not vulcanized. The trailing cables were not protected against overloads except such protection as is given by circuit breakers.

The power used on the underground electric circuits is: 2,300-volt alternating current for large stationary equipment, 275-volt direct current for trolley and general power purposes, and 220-volt alternating current for some of the pumps.

The permanent underground electrical stations are well installed in fire-proof structures.

Explosives

Permissible explosives and No. 6 instantaneous electric detonators are used exclusively for blasting in the mine. An adequate amount of incombustible material is used for stemming the charges of explosives in the holes, and the shots are fired by means of nonpermissible shot-firing units. The shot holes are about 2 inches in diameter and are drilled to depths of about 6 inches less than the depths of the undercuts, except when stumps are blasted. The holes, which are properly placed, are drilled by the drillers or cutting machine crews, and the shots are generally fired during the shift by certified shot firers.

The explosives and detonators are placed in especially insulated cars and are taken into the mine during the off shift. The explosives and detonators are stored underground, separately, in wooden boxes located in safe places in each working section. The explosives are attended or kept locked in the storage boxes at all times.

Mine Rescue and Fire Fighting

At least 40 men are trained in mine rescue and additional training is given at monthly periods. Twelve sets of self-contained oxygen breathing apparatus and 5 gas masks are maintained at the mine for use in the event of an emergency. A mine rescue station with adequate supplies and equipment is maintained at the mine.

In addition to keymen and foremen, the mine rescue crews are available in the fire-fighting organization. Fire drills are held; the fire-prevention equipment is inspected on the surface and underground at monthly intervals and records of these inspections are kept. Adequate fire protection is provided by hydrants, hose, an adequate water supply, and fire extinguishers on the surface and underground. In addition, supplies of rock dust and a fire truck are available underground, and fire-fighting stations with supplies of brattice cloth, boards, and suitable tools are provided in each section of the mine.

PREVIOUS EXPLOSIONS IN NEARBY MINES

Numerous explosions have occurred in this section of the Utah coal fields, some of which are listed as follows:

<u>Mine</u>	<u>Date</u>	<u>Fatalities</u>
Winter Quarters	May 1900	200
Castlegate No. 2	March 8, 1924	171
Spring Canyon Storrs No. 1	May 23, 1924	2
Spring Canyon No. 3	January 20, 1930	2
Standardville No. 3	February 6, 1930	20
New Peerless	March 3, 1930	5
Royal	January 4, 1941	1

MINE CONDITIONS PRIOR TO THE DISASTER

Numerous severe bumps or bounces have occurred in this mine, and during past years the system of mining has been changed, with the approval of the U. S. Geological Survey, in an attempt to minimize the bouncing.

At the time of the last Federal inspection, October 1944, it was apparent that the pillar line was not maintained in a straight line, that all of the pillars had not been extracted, and a number of stumps were giving support to the roof. However, the mine superintendent stated that since that time the pillar line was being maintained properly and all of the pillar stumps were being loaded out, or adequately blasted, so that no support was left for the roof in the abandoned areas.

The firebosses' record book disclosed that immediately prior to the explosion the barometer was unusually low, and that accumulations of methane were detected in several places in the mine. It was also noted that those accumulations of methane had been cleared by proper means of ventilation.

STORY OF THE EXPLOSION

The operations in the mine had proceeded during the day without any unusual event. At 1:15 p.m. on March 14, 1945 in the 3 east, 2 slope section, the shot firer had charged and tamped a number of shots which were to be fired at the end of the shift in a stump at the inby end of 5 panel a few minutes previously, and was returning to replace some unused explosives in the storage box; the crew of three men operating the track-mounted cutting machine had left their machine in a crosscut between 5 and 6 panel and were talking to the loading-machine crew and the motorman at the last split in the pillar at the inby end 5 panel; six men were employed at the face of room 10 at 5 panel removing track and setting timbers; the nipper and the face boss were near the switch at the last open crosscut in 5 panel, where the loaded cars had been switched. While the 16 men were at these locations and all the electrical equipment was idle, a very severe bounce occurred in the pillar between the loading machine and the loaded mine cars in the last open crosscut.

A large quantity of coal was thrown from the pillar by the force of the bounce and considerable coal dust was placed in suspension. Methane was undoubtedly given off at the same time, since according to the shot firers and face bosses, methane is given off in considerably increased quantities in this mine when bounces occur. The coal thrown off from one side of the pillar filled the last open crosscut to a depth extending above the mine cars which were 50 inches high; on the other side of the pillar the coal was thrown with such force against the trailing cable of the 250-volt direct-current loading machine that the rubber-covered 2-conductor (war-time) cable was short circuited on the edge of the pipe conduit entering the machine. The trailing cable was burned and torn in two at this point. The resultant electric arc, apparently, ignited the suspended coal dust, or coal dust and methane. The flame of the explosion extended about 320 feet in 5 panel, 3 east, 2 slope, and through the crosscut and room 10 to 4 panel; it also burned 12 of the men in the section.

The shot firer, who was thrown to the floor by the force of the explosion but was not seriously injured, reestablished the ventilation to the section by closing an auxiliary door to replace the check door which was partly blown out. The shot firer also pulled the power-line switch to cut the electric power off the explosion district, and telephoned to the dispatcher for assistance. The gases given off by the explosion apparently had no adverse effect on the men, and all, after receiving first-aid treatment for their burns, were outside of the mine 1-1/2 hours later.

Other sections of the mine were notified, and all employes were taken to the surface without difficulty. A total of 168 men was in the mine at the time of the explosion, according to the check-in-and-out record kept at the lamp house.

INVESTIGATION OF CAUSE OF EXPLOSION

An investigation of the explosion was made on March 14-16, 1945 by the following persons:

Stanley C. Harvey, chief coal-mine inspector, State of Utah.
Paul Keyser, president, Independent Coal & Coke Company.
E. H. Burdick, consulting mining engineer, Independent Coal & Coke Co.
George Jackson, superintendent, Independent Coal & Coke Company.
E. O. Jackson, general mine foreman, Independent Coal & Coke Company.
S. F. Fratto, safety engineer, Independent Coal & Coke Company.
R. R. Knill, consulting safety engineer, Independent Coal & Coke Co.
R. S. Robbins, chief engineer, Independent Coal & Coke Company.
W. B. Odendahl, coal-mine inspector, Bureau of Mines.
H. J. McCreary, safety instructor, Bureau of Mines.

Little physical damage was done to the mine and no recovery operations were necessary except replacing the check door which was partly blown out with its frame, replacing badly charred line brattice, cleaning up some of the coal from the pillar and rerailing the loaded 5-ton steel cars which were thrown off the track by the force of the coal, replacing a number of broken timbers, and replacing the trailing cable in the loading machine.

During the inspection of the explosion area, it was observed that the caterpillar loading machine used in 5 panel was not maintained in an explosion-proof condition, and the trailing cable was not protected against overloads by means of fuses at the nips.

Appendix 3 is a sketch of the explosion area, and the forces, as shown in the sketch, originated apparently at the loading machine in the last split of the pillar at the inby end of 5 panel, 3 east, 2 slope. From indications that were apparent after the explosion, the flame extended about 170 feet from the loading machine inby and down No. 10 room to 4 panel and about 260 feet outby the loading machine in 5 panel, as well as through the crosscut to 4 panel.

There was no indication of coke in the area; however, charred timbers and brattice cloth, and soot on timbers, ribs, and equipment, gave sufficient evidence of the flame in the pillar splits between 9 and 10 room. Survivors of the blast and men outside of the flame limits stated that the fire lasted 10 seconds or more and that the clothing on the 12 injured men was on fire; in some cases the clothing was burned through to the person's body.

Good housekeeping had been practiced in the mine and no accumulations of inflammable material, such as papers from lunches, rock-dust bags, or other highly combustible material, was present, and no fires which might have increased the seriousness of the condition were started.

The well-rock-dusted condition of the mine definitely confined the explosion to the immediate area of the bounce. Employees on the main 2 slope haulageway 2,000 feet outby from the explosion area stated that a thick cloud of mine dust had swept past them. The explosion area and the mine as a whole are very dry and if the coal dust in this area had not been rendered non-explosive by the liberal use of rock dust, it is reasonable to assume that

the explosion would have been propagated to other parts of the mine. It is doubtful if the volume of the openings would have stopped the explosion without the liberal use of rock dust.

It is the opinion of the Bureau representative that the explosion was caused by the severe bounce in the pillar throwing coal dust into suspension and the coal dust or coal dust and methane ignited by the electric arc when the trailing cable of the loading machine was torn and burned in two. It is also believed that sufficient coal dust was thrown into suspension that an ignition would have resulted without the presence of any methane.

The severity of the bounce was evident from the condition of the pillar after the bounce. A section of the pillar about 60 by 40 feet in by the loaded mine cars had dropped about 6 inches from the roof. Following the disaster, the loading crew in the section reported that 161 mine cars of about 5-ton capacity each were loaded from this area to clean up the split. Members of the loading crew also stated that in their opinion 600 mine cars could be loaded with loose coal from this section of the pillar.

CONCLUSIONS

In the opinion of company officials, the cause of the disaster was the ignition of the coal dust, thrown into suspension as a result of the bounce, by an electric arc from the trailing cable which was severed by the force of the coal thrown against it. The superintendent stated that he did not think methane entered into the blast.

RECOMMENDATIONS

Since it is known that bounces can be minimized by maintaining a straight pillar-extraction line, and by extracting all the coal from the pillars so that no roof support is left by the coal, every effort should be made to continue the extraction of pillars along these lines.

Because a similar condition could recur at any time, every precaution should be taken to avoid the possibility of a source of ignition. The following recommendations are offered as reasonable safety precautions that should be taken.

1. The trailing cables of portable and semi-portable electrical equipment should be provided with overload protection by proper connections to permissible junction or distribution boxes or other effective method.
2. Permissible electrical equipment or explosion-proof electrical equipment should be maintained in a permissible or explosion-proof condition.
3. The additional fog nozzles to allay the coal dust in the pillar regions which have been on order should be installed as soon as received.

ACKNOWLEDGMENTS

The assistance and cooperation given during this investigation by Mr. Paul Keyser, president of the Independent Coal & Coke Company, Mr. George Jackson, superintendent, and other officials of the company, and by Mr. S. C. Harvey, chief coal mine inspector of the State of Utah, are gratefully acknowledged.

Respectfully submitted,

W. B. ODENDAHL
Coal Mine Inspector

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APPENDIX 1

STATEMENTS OF WITNESSES RELATING
TO THE
KENILWORTH MINE EXPLOSION MARCH 14, 1945

Kenilworth, Utah
March 15, 1945

I, Blain Olsen, make the following statement concerning the accident that occurred in the Kenilworth mine of the Independent Coal & Coke Company on March 14, 1945:

I had just been through the three working places off No. 5 Panel and had talked to all the men on the district as I came through and conditions were normal. I had just started back out No. 5 Panel to get my cap bag and had got out about 170 out by No. 9 room, No. 5 Panel, when suddenly I was knocked flat on the floor with a terrific force and I noticed a very loud noise. When I looked up I saw the flash going over my head.

I then ran down through the cross-cut leading to No. 4 Panel and decided to go back and find my safety lamp where it fell as I decided I might need it. I came back in the smoke and dust and found my lamp and at that time I met Art Lermusiaux, Iven Jensen and George Archibeque, these men had their clothes burning. I then led these men down through the cross-cut to No. 4 Panel and down into No. 5 room. I then called for help to the dispatcher on the telephone. After I pulled the power the other men from the district, except Art Smith, the motorman, came walking out. We then decided to follow the fresh air and try to find Smith. We worked our way through the smoke and dust and when we came close to Smith, on the mention of his name, he answered us. We then carried him out on stretchers at the bottom of No. 5 room, where he was treated for burns. We then got additional help from the other sections.

/s/ Blain Olsen

Witness /s/ Sam Fratto

Witness /s/ Forbes C. Fail

Kenilworth, Utah
March 16, 1945

I, Walter D. Herrera, sprinkler in the Kenilworth mine of the Independent Coal & Coke Company make the following statement concerning the accident that occurred in the above mine on March 14, 1945.

I got out of No. 10 room about three minutes before the explosion occurred. I had just got into No. 3 Panel to connect my water hose to start sprinkling the room when the pipe man came in. We set down and started to talk and had been setting there about a minute or two when the noise we supposed to be a bounce occurred. Brooks, the pipeman, said that was the hardest bounce he had known in this mine. At that time I thought I heard someone yell and I said I'm afraid someone is hurt, lets get out of here. We then walked out and met three men, the shovel operator and helpers and their clothes were all on fire. We then started putting out the fire burning their clothes and took the men to the parting where Brooks called up on the telephone to get help. At that time three or four men came down No. 5 Room, they were all pretty well burned. Shortly after that the motorman came down also and we decided to go in and bring the other men out. After we went in and got the other men it was found that two men were still missing, the motor man and the brattice man, so we decided to go in and look for them, the dust was very thick but we finally found the motorman lying on top of a car of coal. By the time we got back to the parting with the motorman the rescue party had arrived there and were administering first aid to the men.

/s/ Walter DeHerrera

Witness Sam Fratto /s/

Witness Forbes C. Fail /s/

Kenilworth, Utah
March 16, 1945

We, Francisco Mendoza, Julian Ortiz and Aureliano Tafoya, make the following statement concerning the accident that occurred in the Kenilworth mine of the Independent Coal & Coke Company on March 14, 1945:

The three of us were working at the top of No. 10 room. The two of us were tearing out track and Francisco was setting timber along the edge of the cave when we heard the bounce. We immediately ran back toward the high room and when we saw the flash we all fell to the floor. Immediately after the flash we saw Felipe Armijo, the track man, come running back with his clothes all burning and we started to put out the fire in his clothing. We then started toward the main entry bringing Armijo along and found Nick Marakakis who came out at the same time as Felipe. We heard someone yell over by No. 5 Panel and Gilmer Nielson, Jackson, and Dave Bennett came out. We do not know anything about these men from here on out as we went back in trying to find Art Smith, the brattice man, but we were sent back out by those in charge.

/s/

Francisco Mendoza

/s/

Julian Ortiz

/s/

Aureliano Tafoya

Witness /s/ Sam Fratto

Witness /s/ Forbes C. Fail

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APPENDIX 2

COPY OF STATE COAL MINE INSPECTOR'S REPORT
TO THE
INDUSTRIAL COMMISSION OF UTAH
SAFETY DIVISION

S. C. Harvey
Safety Division

March 26, 1945

State Industrial Commission

Safety

Gentlemen:

Fatal accident to:
Arthur Smith David W. Bennet
Ivan Jensen Gilmer Nielson
Elem Hawks Russel Jackson
in the Kenilworth Mine of the
Independent Coal & Coke Company
at Kenilworth, Utah, March 14,
1945.

I hereby submit report of investigation of local explosion in the pillar section of the 3rd East entry off No. 2 slope of the Kenilworth mine of the Independent Coal & Coke Company at Kenilworth, Utah, on March 14, 1945.

As a result of this explosion twelve men in the above named section suffered burns of various degrees and six of the men involved have died of their injuries, at the time of making this report.

The names, age, occupation and marital status of the injured men are listed below. Also the mention of those men who have died prior to this writing.

	Richard Farrimond	53	Years	Married	Section Foreman
	Nick Marakis	52	do.	Married	Timberman
	Alcaric Quintana	50	do.	Married	Trackman
(Dead)	Arthur Smith	44	do.	Married	Motorman
(Dead)	Ivan Jensen	40	do.	Married	7 A.U. Cutting Mach. Operator
(Dead)	Clom Hawks	42	do.	Single	7 A.U. Cutting Mach. Helper
(Dead)	David W. Bennet	27	do.	Married	7 A.U. Cutting Mach. Helper
	Arthur Lermusiaux	47	do.	Widower	Faceman
	Geo. Archibeque	37	do.	Married	Motor Nipper
(Dead)	Gilmer Nielson	35	do.	Married	Joy Loading Mach. Operator
(Dead)	Russel Jackson	27	do.	Married	Joy Loading Mach. Helper
	Felipe Armizo	44	do.	Married	Trackman

The explosion occurred at 1:15 p.m. on Wednesday, March 14, 1945 immediately following a severe "bounce" in the pillar section where the injured men were working. Said "bounce" throwing into suspension, in the surrounding atmosphere, a large quantity of fine coal dust and probably an unknown amount of methane, which happens frequently when "bouncing" occurs in gaseous mines. This explosive mixture of coal dust, or coal dust and

methane, was ignited by the short-circuiting of a 250 volt direct current, rubber insulated, two conductor machine cable which was ruptured at the point of entrance into the loading machine, when a severe strain was put on the cable by a large amount of loose coal which was dislodged by the "bounce."

From indications that were apparent after the accident it is estimated that flame limits extended about 260 feet outby or in a westerly direction from the point of ignition and about 170 feet inby, and was confined to a distance not to exceed 100 feet in cross-cuts running at right angle to what is considered the main line of force.

No definite indication of coke was found anywhere in the area and soot was confined to only a moderate coating on the ribs, roof and timbers, possibly indicating that combustion was almost complete. The fact that none of the men were overcome by gas as a result of the ignition and that all but one man came out without help also seems to substantiate this theory. Brattice cloth which was erected for a lead was badly burned. This burning was evident only in the pillar split between No. 9 and No. 10 room and burning was more pronounced as it neared the roof. Clothes were burned on a number of the injured workmen also, and in some cases clothes had been burned through to the workman's body. This is believed to indicate that the duration of the flame extended to some time more than a mere flash.

Due to good housekeeping, no accumulations of inflammable material such as papers, wood chips, etc. were present, and which may have held fire and started a more or less serious fire after the explosion.

The systematic use of rockdust in this mine no doubt limited the explosion to a small area as indicated on the sketch which is attached to the report. The plentiful supply of rockdust which was applied in the area where the explosion occurred and in all districts throughout the mine was also instrumental in saving the lives of all men in the mine at the time of the explosion. According to the Coal Company records, the total of all men working in the mine at the time of the explosion was 168.

A good idea of the amount of rockdust being used in the Kenilworth mine can be given by the following records which were taken from the books of the Independent Coal and Coke Company:

January 1, 1944 to January 1, 1945	- 2.7 lbs. per ton of coal mined.
January 1, 1945 to February 1, 1945	- 4.7 Do.
February 1, 1945 to March 1, 1945	- 4.7 Do.

It is assumed that the recent increase in the amount of rockdust used per ton mined is due to the recent purchase of a new high-pressure rock-dusting machine.

Rescue work was organized in good time and adequate help was at the scene of the accident in a few minutes after the blast occurred. With the exception of two of the injured men who traveled a considerable distance in their excitement before help arrived, all injured men were given treatment for burns before leaving the entry where the explosion occurred.

One sad part of the explosion is the fact that the cutting machine operator and his two helpers, all of whom are now dead, were believed to be waiting for a place to be cut and were merely visiting in the explosion area when the blast occurred. Had these men been near the cutting machine they would, no doubt, have escaped any injury as the conditions near the cutting machine indicate.

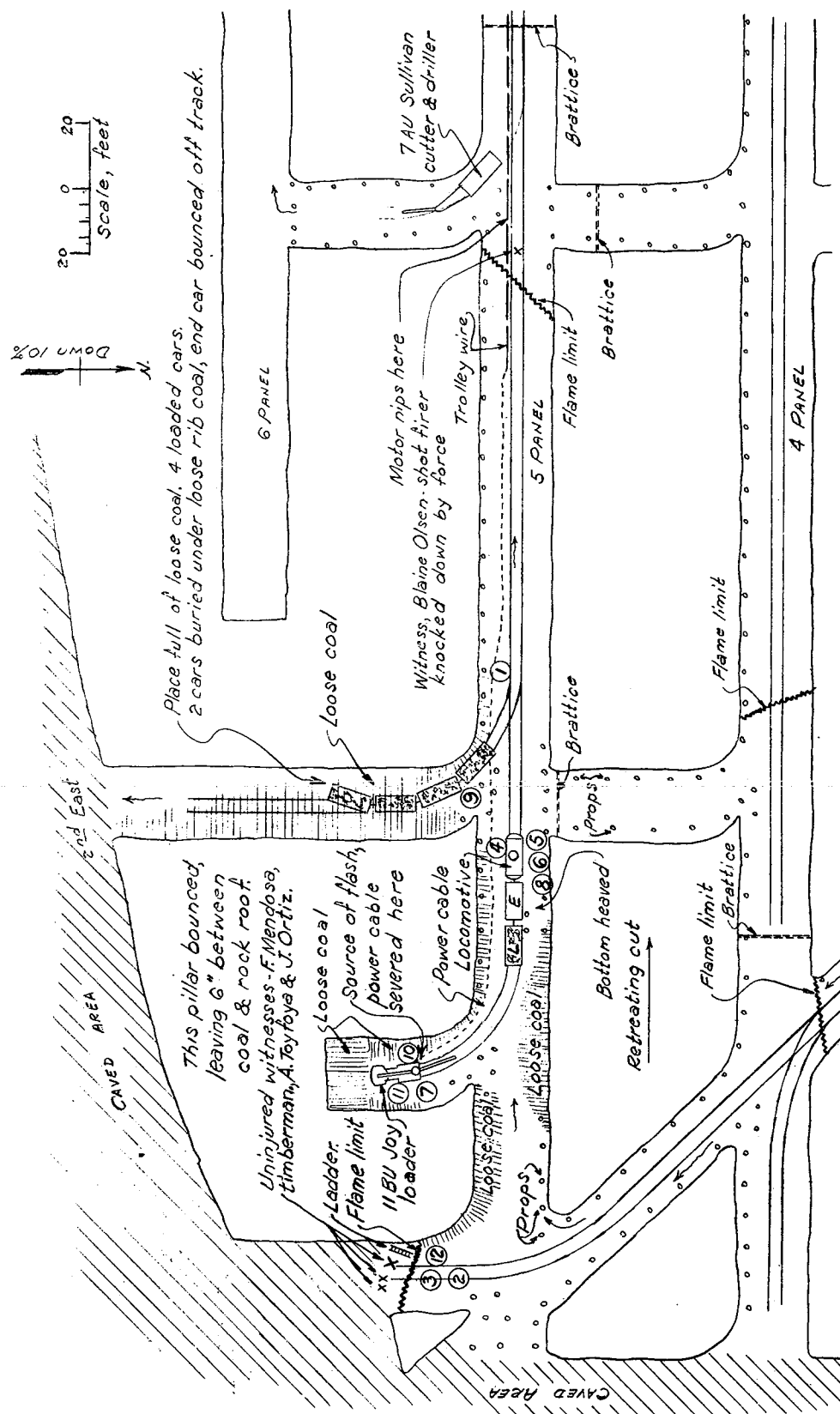
Three men of six who were working on track and timber in No. 10 room were burned when they ran down the room on hearing the "bounce" and ran into the flames coming out of No. 5 panel. Three men who remained where they were in No. 10 room were uninjured.

Individual statements of witnesses, Blain Olsen, a shot-firer, and Walter DeHerrera, sprinkler, and a joint statement of Frank Mendoza, Julian Ortis, and Aureliano Tafoya, who were in No. 10 room 3rd East and about 110 feet from the point of origin of the explosion are attached to this report. None of the above witnesses were injured.

Respectfully submitted,

S. C. Harvey

Chief Coal Mine Inspector

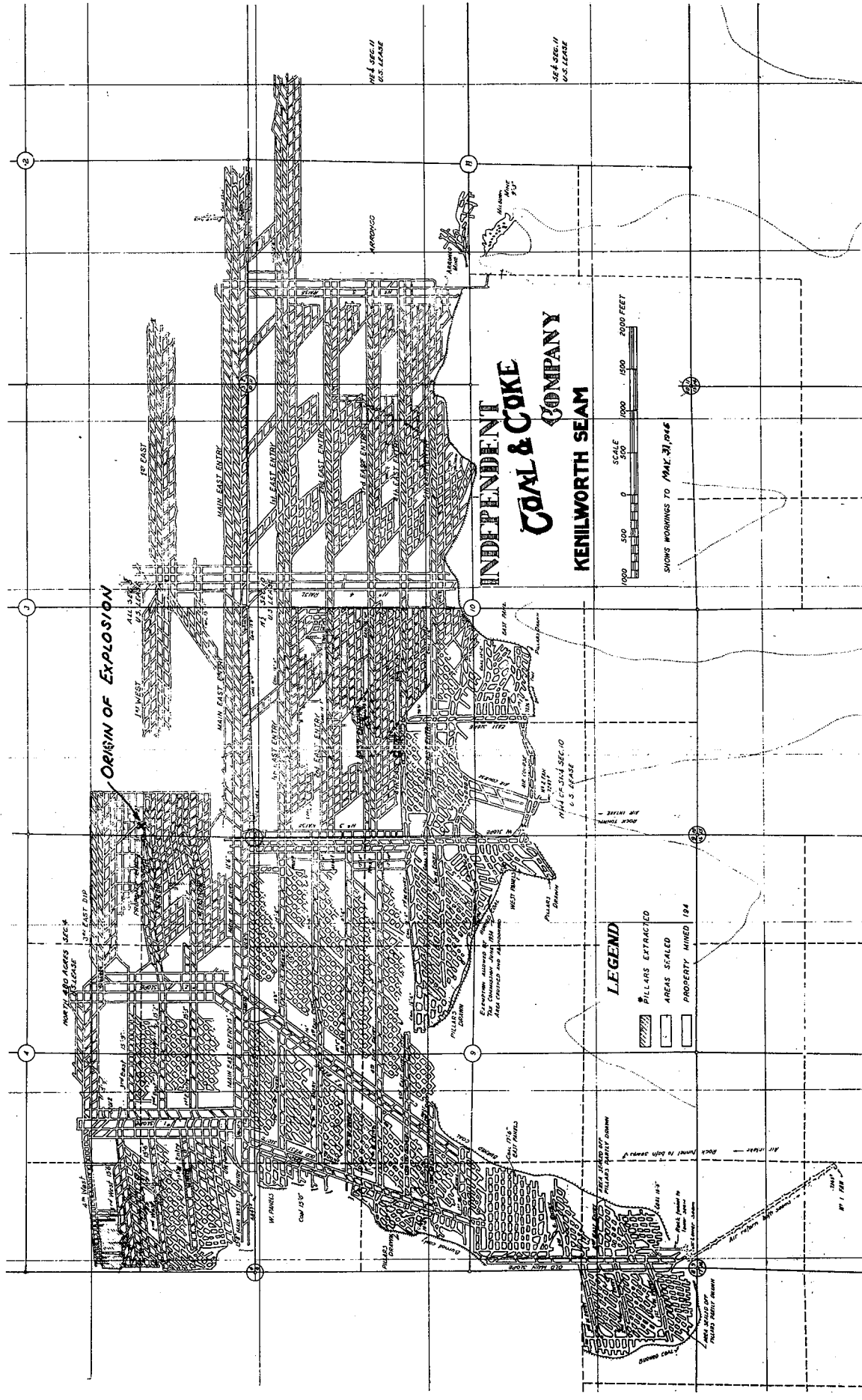


SCENE OF FATAL ACCIDENT
REILLY CO. COKE COMPANY

ACCIDENT OCCURRED AT 1:15 P.M., ON WEDNESDAY, MARCH 14, 1945, AT THE INSIDE END OF NO. 5 PANEL ON THE THIRD EAST SHIFT OFF NO. 2 SLOPE. IT WAS CAUSED BY A BOUNCE ORIGINATING IN THE PILLAR DESIGNATED ABOVE, WHICH THREW COAL DUST INTO SUSPENSION AND AT THE SAME TIME SEVERED THE POWER TRAILING CABLE ON THE 11 BU JOY LOADER, CAUSING AN ELECTRIC ARC WHICH IGNITED THE SUSPENDED COAL DUST. 12 MEN OF THE 16 MAN CREW, RECEIVED SEVERE BURNS FROM THE FLASH. ALL WERE ADMINISTERED FIRST AID AND THEN REMOVED FROM THE MINE TO THE HOSPITAL. LATER 7 MEN WERE TRANSFERRED TO THE PRICES HOSPITAL WHERE 5 PASSED AWAY WITHIN 48 HOURS. NUMBERS ENCIRCLED OF THE ABOVE SKETCH SHOW THE LOCATION OF THE INJURED AT THE TIME THE ACCIDENT OCCURRED. THEIR NAMES, AGES, MARITAL STATUS AND OCCUPATIONS ARE TYPED IN THE LOWER LEFT CORNER.

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|-----|-------------------|----|--------|----------|---------------------|
| 1. | RICHARD FARMOND, | 52 | years, | Married, | Section Boss |
| 2. | NICK MARAKIS, | 52 | " | " | Timberman |
| 3. | ALVARO QUINTANA, | 50 | " | " | Trachman |
| 4. | ARTHUR SMITH, | 44 | " | " | Motorman |
| 5. | IWAN JENSEN, | 40 | " | " | 7 AU Mech. Operator |
| 6. | CLEM HAWES, | 42 | " | Single, | " " Helper |
| 7. | DAVID W. BENNETT, | 27 | " | Married, | " " " " |
| 8. | ARTHUR IEROSOLIM, | 47 | " | Widower, | Fireman |
| 9. | GEORGE ARCHERQUE, | 37 | " | Married, | Ripper |
| 10. | GILMER NELSON, | 35 | " | " | Shovel Operator |
| 11. | RUSSEL JACKSON, | 27 | " | " | Shovel Helper |
| 12. | FELIX ARMIZO, | 44 | " | " | Trachman |

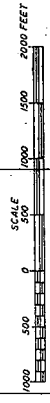
NOTE - ## indicates died within 48 hours after explosion.
 XXX indicates date of death as result of explosion.



ORIGIN OF EXPLOSION

**INDEPENDENT
COAL & COKE
COMPANY**

KENILWORTH SEAM



SHOWS WORKINGS TO MAR. 31, 1946

LEGEND

- PILLARS EXTRACTED
- AREAS SCALED
- PROPERTY MINED 194

NORTH 480 ACRES SEC. 16

SEC. 11
U.S. LEASE

SEC. 17
U.S. LEASE

1

2

3

11

12

13

14

15

3rd EAST DIP

2nd EAST DIP

1st EAST DIP

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