1947-0005

FINAL REPORT OF MINE EXPLOSION
NO. 8 MINE
OLD BEN COAL CORPORATION
WEST FRANKFORT, FRANKLIN COUNTY, ILLINOIS
July 24, 1947

COAL FATAL

27 KILLED

By

W. A. Gallagher
W. R. Chick
H. C. Brumbaugh
T. C. Higgins

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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INTRODUCTION

An explosion, evidently caused when gas was ignited by a spark or arc from a gathering locomotive or by smoking, and in which coal dust was involved, occurred in the No. 8 mine, Old Ben Coal Corporation, located just south of West Frankfort, Franklin County, Illinois, at about 12:35 p.m., July 24, 1947. The explosion resulted in the death of 27 men, of which number 26 were killed by burns, violence, and afterdamp. There were 30 men in the vicinity of the explosion area, and 4 of these men escaped to the surface with the assistance of other workmen. One of the rescued men later died in the hospital. Two hundred and sixty-four men were in the mine at the time of the explosion, of which number 234 escaped to the surface unaided. No attempt to barricade was made, as the explosion covered only a small section and did not affect any other portion of the mine.

The Vincennes office of the Bureau of Mines was notified about 2 p.m. by Mr. H. C. Brumbaugh, Federal coal-mine inspector, who was informed by Mr. Roy Adams, general mine superintendent, that there was a fire in the 13 east section of the mine, and about 25 men in that section were unaccounted for. Other Federal inspectors were notified by Mr. C. A. Herbert, supervising engineer, District E, and they went to the mine as soon as possible. A total of 7 representatives of the Bureau of Mines participated in the recovery operations, the investigation, or both.

GENERAL INFORMATION

Location

The No. 8 mine of the Old Ben Coal Corporation is located just south of West Frankfort, Franklin County, Illinois, and is served by the Illinois Central, the Chicago, Burlington, and Quincy, and the Chicago and Eastern Illinois railroads.

Operating Officials

D. W. Buchanan	President	Chicago, Illinois
George F. Campbell	General Manager	Chicago, Illinois

R. L. Adams	General Superintendent	West Frankfort, Illinois
Ernest Green	Assistant General Superintendent	West Frankfort, Illinois
J. W. McDonald	Chief Engineer	Christopher, Illinois
J. E. Jones	Safety Engineer	West Frankfort, Illinois
Howard Lewis	Superintendent	West Frankfort, Illinois
Don Bowker	Mine Manager	West Frankfort, Illinois

The company also operated the Nos. 9, 11, 14, and 15 mines in Franklin County, Illinois. The main offices of the company are located at 230 South Clark Street, Chicago, Illinois.

Employees and Production

A total of 495 men was employed, of which number 382 worked underground on two shifts, and the average daily production was 3,500 tons of coal.

Openings and Nature of Coal Bed

The No. 8 mine is opened by three shafts, each sunk to a depth of about 464 feet. The coal hoisting shaft is wooden-lined and has two compartments, and is used as one of the upcasts. The other upcast shaft is located 285 feet west of the hoisting shaft and the intake air shaft is located 6,312 feet south of the hoisting shaft. These shafts were wooden-lined and were equipped with wooden stairways to be used as escapeways, and they were in good condition.

The mine is operated in the Illinois No. 6 coal bed which averages 90 inches in thickness in this area, and lies flat except for local undulations. The cover over the coal bed ranges from 464 feet to 500 feet at this property.

The immediate roof is variable but usually consists of from 18 to 20 inches of roof coal and 24 to 30 inches of gray shale.

The outstanding characteristics of the coal bed are numerous sulfur and shale bands, of which the most persistent is the "blue band." Frequent slips, rolls, and faults occur throughout the coal bed.

The floor underlying the coal bed is smooth, medium hard fire clay which varies in thickness from 12 to 48 inches.

Coal Analyses

Samples of coal taken in nearby mines operated in the No. 6 coal bed and analyzed by the United States Bureau of Mines showed approximately the following:

	Percent
Moisture	7.5
Volatile Matter	32.7
Fixed Carbon	50.3
Ash	9.5
	100.0

The ratio of volatile matter to total combustible matter, as given above:

$$\frac{\text{Volatile Matter}}{\text{Volatile matter + Fixed carbon}}$$

is 0.39 for the No. 6 coal bed in this field.

MINING METHODS, CONDITIONS, AND EQUIPMENT

Mining Methods

The No. 8 mine was worked by the room-and-pillar method, the system being so arranged that each pair of room entries formed a panel. The mine was not laid out with reference to butt and face cleavage planes, as neither is defined distinctly in this district.

The main entries were driven four abreast. The cross entries were generally driven four abreast, but in some instances only three were driven. Room entries were driven in pairs. All entries were driven 12 feet wide on 37-foot centers, except along the main haulageway for a distance of 8,000 feet from the shaft bottom. Here the entry was 18 feet wide to accommodate a double track system.

Rooms were driven 28 feet wide on 45-foot centers. Crosscuts were turned at 60-foot intervals and were generally driven at regular entry and room widths. Cross entries were turned at right angles to main entries at 1,475-foot intervals. Room entries were turned at right angles to the cross entries and the rooms were turned parallel to the cross entries. A 90-foot barrier pillar was left between the cross entries and the first room turned off the room entries.

Panel entries were driven at 504-foot intervals and the rooms were driven to a depth of 242 feet each way from the entries, leaving a 20-foot barrier pillar between panels. About 65 percent of the coal was recovered by this method, all in advance work, except the barrier pillars along the cross entries which were mined after the panel entries had been worked out. Some additional coal was recovered by slabbing or

splitting the room pillars. This was not done in a systematic manner, but according to the conditions encountered in the rooms being mined.

The coal was undercut to a depth of 8-1/2 feet with nonpermissible arcwall mining machines, and was drilled with nonpermissible post-mounted electric drills. Generally, the coal was loaded into mine cars with nonpermissible track-mounted loading machines; however, a few hand loaders were used at the inby ends of the barrier pillars being recovered.

A systematic method of timbering the working places was being followed, but safety posts were not set between the permanent timbers and the working faces.

Ventilation and Gases

Ventilation was provided by an 8- by 4-1/2-foot centrifugal fan, operated blowing and located about 24 feet from the edge of the downcast shaft. The fan was driven by a 150-horsepower 2,300-volt alternating-current motor. Auxiliary power was not available in the event of failure of the motor or the alternating current. The fan house and the air duct were constructed of incombustible material, and the fan was protected against excessive pressures by explosion doors. During the Federal inspection of January 7-10, 1947, the fan was delivering 117,840 cubic feet of air a minute into the mine at a water-gage pressure of 5-1/2 inches. The direction of the air flow was readily reversible. A pressure-recording gage, air-lock doors to the fan, and an audible warning device in the hoisting room were provided. The fan was run continuously and was attended while the mine was in operation.

The air was conducted from the shaft into the mine through parallel entries, and was divided into 4 splits. It was returned along the main haulageways to the return air shaft.

Crosscuts were made at 60-foot intervals and not more than one open crosscut was permitted between the faces of entries and the first outby temporary or permanent stopping.

Concrete-block stoppings had been erected in the crosscuts along the main and cross-entry haulageways between the intake and the return airways. Wooden stoppings were used in the panel entries. The overcasts were constructed of incombustible material and were provided with ample space for the free passage of air.

Single doors were erected between the intake and return airways and when open permitted a direct short-circuit of the air.

The mine was considered to be gassy by the Illinois Department of Mines and Minerals, and was classified as gassy by the Bureau of Mines because sampling by the Federal inspectors indicated that methane in excess of 0.25 percent had been found in open workings during all

previous inspections. Gas had also been ignited on two occasions previously which resulted in 8 men being killed, 9 seriously burned, and 11 slightly burned. Six certified mine examiners were employed to make preshift examinations of the mine for gas and to observe and inspect for other hazards. A certified face boss was employed to supervise each loading machine crew, and his duties included making on-shift inspections for explosive gas and other hazards.

Many oil and gas wells penetrated the coal bed, but none was in open workings in the mine.

During the time of the last Federal inspection of January 7-10, 1947, there were 14 air samples collected and the analytical results showed methane ranging from 0.19 to 1.13 percent as follows:

Return last crosscut 3 and 4 S. 17 east	0.78
Return last crosscut 19 and 20 W. M.S.	1.07
Return 19 W. 150' inby M.S. on 17 West.	1.08
Return last crosscut 17 and 18 east M.E.	0.41
Return last crosscut 7 and 8 N. 17 west	1.06
Return 15 east 250' inby M.S. on 15 east.	0.35
Return last crosscut 15 and 16 E. M.S.	0.19
Return 15 W. 150' inby M.S. on 15 west	0.23
Return 17 W. 100' inby M.S. on 17 west.	1.13
Last crosscut 9 and 10 N. 15 east	0.37
Return M.S. 800' inby shaft bottom	0.36
Return last crosscut 17 and 18 W. M.S.	0.94
M.S. return at 11 east	0.34
Return 13 E. at overcast	0.32

Drainage

The mine workings and haulage roads were dry, except for accumulations of water in several small sumps and at the shaft bottom. Four pumps, all of the piston type, were in use in the mine. Three of the pumps were of the gathering type, and the fourth was located in a concrete room near the shaft bottom and was used to pump water from the hoisting shaft sump to the surface.

Dust

The mine was exceedingly dry and an excessive amount of coal dust was raised into suspension during mining operations at the working faces, and some fine coal dust had been carried into the abandoned area and deposited on the ribs, roof, and floor by the ventilating current. Watering methods had not been employed to allay the dust at its source, but generalized rock dusting was practiced and the rock dust was kept to within 80 feet or less of the working faces. Bags of rock dust were suspended from timbers in the airways outby the active working area; however, these barriers played little or no part in preventing the propagation of the explosion as only a few of the bags of rock dust had been tripped.

The rock dust from the bags that had been tripped was found on the floor immediately below the installation and no evidence of dispersal of the rock dust was observed.

The analytical results of dust samples collected in the mine during the January 1947 Federal inspection are shown in the following table:

Sample of dust

From	Location in mine	Combustible	Incombustible
Road	150' inby M.S. on 19 W.	45.3	54.7
Rib & Roof	do	14.6	85.4
Road	100' inby M.S. on 17 E.	42.7	57.3
Rib & Roof	do	11.6	88.4
Road	125' inby M.S. on 17 W.	30.2	69.8
Rib & Roof	do	22.5	77.5
Road	250' inby M.S. on 15 E.	71.4	28.6
Rib & Roof	do	28.2	71.8
Road	150' inby M.S. on 15 W.	20.6	79.4
Rib & Roof	do	5.2	94.8
*Road	125' inby M.S. on 13 E.	47.2	52.8
*Rib & Roof	do	30.7	69.3

*Samples collected in the section affected by the explosion.

It will be observed from this table that 4 of the 12 samples collected contained less than the 65 percent incombustible matter recommended as a minimum by the Bureau of Mines; however, this deficiency was not a factor in this explosion.

Additional dust samples were collected during the investigation of the explosion, the analytical results of which are shown in table 1.

It will be observed that the roof and rib samples contained from 31.7 to 78.4 percent incombustible matter and the incombustible contents of the road samples were from 25.4 to 46 percent. Attention is called to the fact that all samples were collected within the explosion area and the ribs, roof, and floor were coated heavily with coal dust carried and deposited by the explosion. Samples P-561 and R-4 were collected at the point where the forces of the explosion died out and the ribs at this location showed only a light film of coal dust.

Haulage

Main haulage was accomplished with 13-ton electric trolley-pole locomotives over a single-track system except for a distance of 4,000 feet from the shaft bottom where a double-track system was used. Trolley-pole and cable-reel locomotives were used for servicing loading machines and secondary haulage.

The cars of coal were hoisted on two self-dumping cages to the top of the tipple where they were dumped. The coal hoist, which was also used for handling men and materials, was of the double step-up drum type and was electrically driven. One and one-half-inch diameter ropes were used. The hoist was equipped with automatic overwind, overspeed, and stop controls, and a positive acting indicator to show the position of the cages. The hoisting equipment, including the rope, was inspected three times daily by the top cager and engineer, and written records were kept of these inspections.

Electric Equipment Underground

Electric power was purchased from the Central Illinois Public Service Company and was received at the transformers as 33,000 volts alternating current and was stepped down to 2,300, 220, and 110 volts alternating current by transformers located on the surface. A total of five sub-stations was provided and these stations were also located on the surface.

Electric power was taken into the mine through the air shaft, the upcast shaft near the bottom, and a borehole located near 13 east, main south. The power was distributed in the mine through insulated cables as 275 volts direct current. This was the only electric power in the mine, and it was used to operate all inside machinery. The feeder and trolley lines throughout the mine were securely supported on insulated hangers and were sectionalized at about 3,000-foot intervals. Cut-out switches were also provided for the trolley lines at all intersections. All power and trolley lines were in return air.

All mining machines, loading machines, drills, and cable-reel locomotives were of the nonpermissible type and received their power through trailing cables connected to power wires located in return air.

Lighting

Incandescent electric lights operated from the mine circuit were installed at the shaft bottom, track switches, doors, and other strategic places. Permissible-type electric cap lamps were used by all underground employees for individual illumination. All underground foremen used permissible flame safety lamps which they cleaned, filled, assembled, and left at the mine examiners' office when not in use.

Rules prohibiting smoking have been adopted.

TABLE 1 - Dust Analyses Report

Mine No. 8 Company Old Ben Coal Corporation Collected July 25, 1947

Can No.	Sample of	Location in Mine	Rock-Dusted	As Received Basis		Coke Particles Present
				Combustible	Incombustible	
T-141	Floor	2 room 8 north 13 east	Yes	72.8	27.2	Medium Amount
B-478	Rib & Roof	do	Yes	57.5	42.5	Medium Amount
M-344	Rib & Roof	13 east parting entry 150' outby 7 north	Yes	56.4	43.6	Small Amount
V-902	Floor	do	Yes	74.6	25.4	Small Amount
F-139	Rib & Roof	13 east 150' outby 7 north	Yes	48.6	51.4	Small Amount
H-751	Floor	do	Yes	59.8	40.2	Small Amount
M-289	Roof & Rib	14 east 150' outby 7 north	Yes	68.3	31.7	Trace
X-895	Floor	do	Yes	64.9	35.1	Trace
F-189	Roof & Rib	14 east air course 150' outby 7 north	Yes	46.9	53.1	Trace
P-484	Floor	do	Yes	54	46	Trace
P-561	Roof & Rib	13 east near 3 north	Yes	21.6	78.4	None
R-4	Floor	do	Yes	61.5	38.5	None
B-862	Post	N.E. side of post at 7 room 8 north off parting entry		65.4	34.6	Very large Amt. (largest)
F-824	Post	Same as above but on S.W. side		67.4	32.6	Medium Amount
U-255	Floor	Inby 9 south on 14 east	Yes	70.5	29.5	Very large Amount

Explosives and Blasting

Generally, Cardox model 3-200 was used to blast coal and the shells were charged at the Cardox Corporation charging plant located at Benton, Illinois, about 9 miles from the mine. However, Airdox was used bo break coal in one section of the mine. The charged Cardox shells were hauled to the mine during the morning and loaded into specially constructed insulated cars. The cars were sent underground during the off shift, and the charged shells were stored in insulated cars in the working sections.

Three drillers worked together and started to work at 10 a.m., which is two hours after the regular shift starts. Two nonpermissible post-mounted drills were used in each place and two holes were drilled concurrently. While two men operated the drills, the third man removed a predetermined number of charged shells from the storage car and leaned them against the rib near the working face and wired them. The negative wire was attached first and the wires were short-circuited before the positive wire was attached. Both bare and insulated wires were used in wiring the shells.

On completion of the drilling, the charged shells were inserted into the drill holes. Twin-conductor, rubber-covered cables were used and were at least 125 feet long. Short-circuits from the charged shells were removed just prior to attaching the blasting cable to a Cardox shell. Nonpermissible Atlas 2A, 10-shot blasting machines were used for all blasting, and the shots were fired after all men except the shot firers had left the mine.

Mine Rescue

About 50 men at this mine have received mine rescue training at various times, but none has had mine rescue training in recent years.

Six gas masks were available at the mine, and six self-rescuers were kept in a dustproof metal box at 11 east off main south in intake air. The nearest State-maintained mine rescue station and mine rescue team was at Benton, Illinois, about 9 miles from the mine. Other State-maintained and privately-owned mine rescue stations and mine rescue teams were from 35 to 120 miles away. The United States Bureau of Mines rescue truck and apparatus were located at Vincennes, Indiana, about 118 miles from the mine.

Fire Fighting

All buildings within 100 feet of the mine openings, and vital structures were of fireproof construction. The electrical circuits were installed on knobs, and enclosed switches were used. The surface fire protection consists of pipe lines, water hose, hydrants located at strategic places, and an

elevated steel water tank. The tank, which has a capacity of 10,000 gallons of water, is supported on structural steel members. Water is supplied by the city of West Frankfort Water Company. Additional fire protection is provided by portable fire extinguishers of various types, located at convenient places in the surface buildings.

The fire-fighting equipment underground consisted of soda-acid fire extinguishers, volatile liquid fire extinguishers, one portable water tank with a capacity of 500 gallons, one portable pump, bags of rock dust throughout the mine, 2-inch water line extending from the surface through the hoisting shaft along the main haulageways to 5 and 6 south on 15 west, and water hose located at strategic places along the haulageways. Water taps were placed at 300-foot intervals.

PREVIOUS EXPLOSIONS IN THIS MINE

A gas explosion occurred in this mine on January 14, 1921. Forty-one men were in the mine at the time of the explosion, but only twenty-one were working in the section of the mine affected. One man died 24 hours after the explosion; nine men were seriously burned, and eleven were slightly burned. The explosion was caused by a workman smoking. Rock dust prevented the explosion from spreading to other parts of the mine. These accident data were obtained from a report of the United States Bureau of Mines by J. J. Bourquin.

A second explosion occurred on December 1, 1929. Twenty-four men were in the mine at the time of the explosion, but only seven men were working in the section affected. All seven men were killed instantly. Rock dust prevented the explosion from spreading to other parts of the mine. These accident data were obtained from the "Monthly Safety Report" of the Old Ben Coal Corporation, written by John E. Jones.

MINE CONDITIONS IMMEDIATELY PRIOR TO DISASTER

The mine was operating normally, and no unusual conditions, insofar as could be ascertained, had been reported prior to the time of the explosion. The fan was working properly and no interruptions had occurred in the main ventilating system.

The mine examiners' reports for July 24 indicated normal mining conditions, and all places in the 13 and 14 east section were reported to be in safe working condition. The ventilating current was traveling

in its regular course and the mine examiner reported that 6,600 cubic feet of air a minute was passing through the last open crosscut. The 13 and 14 east entries had been driven as far in as the 21 and 22 north and south room-panel entries, but, at the time the explosion occurred, the barrier pillars along the 13 and 14 east entries had been partly recovered to a point midway between the 8 and 9 north and south room-panel entries by driving short rooms into these pillars. The worked-out area was not ventilated properly or sealed.

The United States Weather Bureau offices at Springfield, Illinois, and Cairo, Illinois, showed barometric pressures of 29.81 and 29.90 inches of mercury, respectively, at noon on the day of the explosion. A barometer at the mine showed the pressure to be 29.70 inches of mercury in the morning. The pressure was constant at both Weather Bureau stations, with a slight normal midday drop of approximately 5 or 6 one-hundreths of an inch.

PROPERTY DAMAGE

The explosion caused no damage on the surface. The only place affected in the mine was the 13 and 14 east section of the main south where the explosion occurred.

The force of the explosion demolished two and damaged one of the concrete-block stoppings between the 13 and 14 east; three ventilating doors that were erected in crosscuts between 13 and 14 east were destroyed; several cross bars and timbers were blown out, permitting small roof falls; trolley and feeder lines were torn down in several places in the section; and debris, loose rock, and dust were strewn over the track and roadbed. Because of a suspected fire, the management decided to recover the equipment and seal the section, and did not anticipate working this section again; this work was started as soon as the equipment was recovered and the section was closed the following day with temporary seals near the entrance of the 13 and 14 east off main south.

STORY OF EXPLOSION AND RECOVERY OPERATIONS

The explosion occurred at about 12:35 p.m., July 24, 1947, in a working section about 12,230 feet from the main shaft and about 6,000 feet from the nearest escape shaft. The trapper at the 11 east on the main south noticed smoke and dust coming out on the main south entry. He ran to the 13 east and cut off the power from that section. He then went to the telephone and called the mine manager, who was at the main shaft bottom, and told him that something was wrong in the 13 east and that it appeared to be a mine fire. The mine manager notified the surface officials and then proceeded to the 13 and 14 east section.

Mr. Roy Adams, general superintendent, immediately called the Illinois State Department of Mines and Minerals and the superintendents of the Benton and Herrin mine rescue stations, who were asked to send their rescue teams to the Old Ben No. 8 mine at West Frankfort as soon as possible.

The district office of the Federal Bureau of Mines at Vincennes, Indiana, was first notified by Mr. H. C. Brumbaugh, Federal coal-mine inspector, who arrived at the Old Ben No. 8 mine at 1:45 p.m. to see Mr. Roy Adams on business. Upon his arrival at the mine, he was informed by Mr. Adams that there was a fire in the 13 east section off main south and that a number of men might be trapped. Mr. Brumbaugh immediately notified Mr. C. A. Herbert, supervising engineer, District E, by telephone at about 2 p.m. Mr. Herbert then directed several other Bureau men to go to the mine. The names of the Bureau personnel who rendered assistance during the rescue and recovery work are as follows: W. A. Gallagher, W. R. Chick, H. C. Brumbaugh, T. C. Higgins, James A. McCune, G. W. Colbert, and Roy Capps. Seven members of the State mine inspection department were present and participated in the rescue and recovery operations. The names and titles of these men are as follows: Harold M. Walker, Director; Robert Weir, Assistant Director; Elmer Edmonds, Inspector-At-Large; James Sneddon, Safety Engineer; and J. R. Wilson, Roy McCluskey, and John Golden, mine inspectors. Two State mine rescue station superintendents and rescue teams were also present and participated in the work.

Mr. Howard Lewis, underground superintendent, and John E. Jones, safety engineer, for the Old Ben Coal Corporation were notified immediately of the trouble at the mine. Upon Mr. Lewis' arrival, he immediately entered the mine and proceeded to the 13 east where he contacted the mine manager, who informed him that it was an explosion that had occurred instead of a mine fire. Mr. Lewis, Mr. Bowker, mine manager, and several other men entered the 13 east. When they reached the affected area, they found four men in a burned and dazed condition and one man dead from the affects of the explosion. These men were removed to the surface promptly. Upon the arrival of Mr. J. E. Jones and State Mine Inspector Elmer Edmonds, which was about 2:15 p.m., these two men, H. C. Brumbaugh, Federal coal-mine inspector, and Ernest Green, assistant general superintendent, immediately entered the mine. About halfway between the main shaft bottom and 13 east they passed the trip in which the four injured and one dead man were being conveyed to the shaft bottom. Upon their arrival at the 13 east switch, they were met by the mine manager, Mr. Howard Lewis, superintendent, and several other mine employees. They entered 13 east entry which is the return air course of the 13 and 14 east section and proceeded to a crosscut outby 5 south where the door had been blown out. At this point they entered the 14 east entry which was the intake air course for this section and proceeded to restore the ventilation and begin the recovery work. Canvas brattices were erected in the crosscuts where the concrete-block stoppings and wooden doors had been demolished by the force of the explosion. Work was continued inward on the intake air course entry. Six bodies were found in a crosscut about 60 feet above the 8 south room-panel entry off 13 east on the intake side of this section. The body of the face boss was found in the last place on the return air side in the place where the

loading machine was broken down, and his safety lamp was found in the vicinity of old 7 north approximately 300 feet from his body, as shown on Map, Appendix B. Mr. W. R. Chick, Federal coal-mine inspector, arrived at the mine about 3:30 p.m. He immediately entered and joined the rescue party at the 8 south off 14 east main south. Other Federal coal-mine inspectors, State officials, and mine rescue teams arrived later and assisted in the recovery work which was completed at 12:30 a.m., July 25, 1947. The last body was found at 11:30 p.m., July 24, 1947. After the last body had been removed, four Federal coal-mine inspectors, who had been assisting in the recovery work, remained in the mine and immediately started an investigation to secure data pertinent to the explosion. After all the bodies were recovered, the company officials, State officials, and the Federal inspectors discussed the removal of the equipment because of the squeezing and falling of rock in the affected area. It was decided to remove the equipment, and this work was completed by 6 a.m., July 25, 1947.

On the morning of July 25, 1947, H. C. Brumbaugh and W. R. Chick, Federal inspectors, entered the mine and proceeded to make a sketch of the affected area. After the sketch was made, they decided to explore as much of the worked-out area as possible above the working section and were accompanied by several of the company officials of the Old Ben Coal Corporation. Two dust samples were collected inby the last working place on 13 east parallel entry and a coke sample from a prop about 150 feet inby 10 south on 14 east parallel entry. At 9 and 10 south and for a distance of 200 feet inby, soot streamers were observed hanging from the roof, and deposits of coke and ash were observed on the floor. Further exploration of this area was considred to be too hazardous due to bad roof, smoke, and fumes.

DETAIL OF EVIDENCE

The map of the 13 and 14 east section of the mine, Appendix "A," shows the underground abandoned and active workings and the course of the ventilating current previous to the explosion. The sketch of the explosion area, Appendix "B," shows on a larger scale the ventilating current previous to the explosion, and probable points of origin, the approximate area traversed by flame, and the approximate area affected by violence. In addition, this sketch shows the locations of bodies of the victims of the disaster, the direction of major forces, and the locations where dust and air samples were collected within the explosion area during the investigation.

Methane as a Factor in the Explosion

The mine is recognized as gassy by the Illinois Department of Mines and Minerals and is classified as gassy by the Bureau of Mines. Considerable methane was liberated in the mine during normal operations.

At the time of the last regular Federal inspection, the mine was liberating in excess of 616,000 cubic feet of methane in 24 hours. All of the samples collected during that inspection showed some methane, the contents ranging from 0.19 percent to 1.13 percent. Table 2 contains the analytical results of air samples collected during the investigation. It will be observed that the methane content of the face samples was 0.33 percent and 0.36 percent, respectively, and the samples collected in return air showed methane ranging from 0.11 percent to 0.35 percent, although when these samples were collected the volume of air passing through the section was 27,000 cubic feet a minute, compared to a normal quantity of 6,600 cubic feet a minute. While no accumulations of gas were detected during the investigation, although tests were made frequently with a permissible flame safety lamp, the results of the analyses of the air samples indicate that the mine was liberating considerable methane at the time of the explosion, and any interruption of the ventilating current might permit an accumulation of explosive gas in the active workings. This is particularly true under the conditions prevailing in the 13 and 14 east section at the time of the explosion where the active workings were adjacent to vast areas of abandoned workings. These abandoned workings were not sealed, they were not ventilated, the conditions in the abandoned workings did not allow thorough inspections because of squeezing and falls of rock, and they might have contained dangerous accumulations of methane.

Forces

Only a small area in the 13 and 14 east section was affected by the flame and violence of the explosion. The afterdamp resulting from the combustion of gas and dust passed directly into the main return and none of the other working sections was affected. The forces were extremely violent in some portions of the explosion area, but diminished rapidly due to expansion into abandoned workings. The direction of forces was determined wherever possible by the movement of material, such as the dislodgment of timbers, shattered remains of stoppings and doors, derailment and overturning of cars, scattered debris, and the bending of trolley hangers. The forces were generally outby from the abandoned area explored inby the 9 and 10 south throughout the explosion area. The velocity of the explosion was extremely rapid in the area between the 5 and 6 north and south and 7 and 8 north and south entries, especially in the vicinity of the 7 and 8 north and south entries. The velocity of the explosion diminished rapidly in the vicinity of the 5 and 6 north and south entries and died out completely at 3 and 4 north and south entries. There was considerable evidence of forces traveling into the abandoned 5 and 6 south entries which obviously afforded pressure relief for the explosion.

While there was much evidence of heat and flame in the abandoned area for a distance of 200 feet inby the 9 and 10 south entries, there was slight evidence of force in this area. Indication of forces traveling outby was plainly evident by the position of dislodged timbers and debris. Definite evidence that the forces were traveling outby and

increasing in violence as they approached the active workings was pronounced. The dislodged timbers, overturned cars, bent trolley hangers, the condition of the bodies of the victims, and other evidence indicated clearly that the explosion attained its maximum velocity in the active working section of the 13 and 14 east.

Flame

The area traversed by the flame of the explosion was determined by a careful examination of the active workings and the accessible parts of the abandoned workings within the explosion area. In this examination, evidence of flame was indicated by deposits of coked particles on mine surfaces and timbers, bits of burned paper and clothing, and charred or burnt splinters on timbers left standing in the explosion area. The flame extended throughout the entire explosion area and outby 5 and 6 south. Signs of intense heat and flame were observed particularly in the rooms off 13 parallel entry inby the 8 north entry. Particles of coke, burnt paper, and charred timbers were observed in the accessible area explored along the 13 and 14 east inby the active working places adjacent to the 7 and 8 north and south entries. Numerous streamers of soot were observed hanging from the roof, and heavy deposits of coke and ash were noted on the floor about 200 feet inby the 9 and 10 south entries. The bodies and clothing of all victims of the blast were burned, which proved definitely that the flame extended throughout the entire explosion area.

Factors that Prevented the Spread of the Explosion

The explosion was localized and was confined to a small area within the 13 and 14 east section. The 13 and 14 east section was ventilated by a separate air split and the other working sections into which the explosion failed to propagate were not affected by the afterdamp. The main haulage road and active workings were well rock-dusted, the last application of rock dust in the 13 and 14 east section having been made on the night previous to the explosion. The back entries had been rock-dusted by machine during development work, and rock dust was suspended in bags at intervals along the entries. The back entries have numerous falls and the floor was generally covered with incombustible rock, but the abandoned part of the 13 and 14 east inby the 7 and 8 south was coated with considerable fine coal dust. That the explosion failed to propagate and was confined to a small area because of the recent liberal applications of rock dust to the mine surfaces throughout the active workings, was demonstrated emphatically. The efficacy of the generalized method of rock dusting over any substitute measure as a means of preventing an explosion from propagating throughout the mine was proved conclusively. Another factor in retarding the development of high velocities as the explosion traveled outby was the existence of large areas of open, abandoned workings which provided space for the relief of pressure.

TABLE 2 - Air Analyses Report

Mine No. 8 Company Old Ben Coal Corporation Collected July 25, 1947

Bottle No.	Date	Hours	Location in Mine	Carbon Dioxide	Oxygen	Carbon Monoxide	Methane	Nitrogen
729-W	7/25/47	3:00 a.m.	13 east return at overcast	0.11	20.77	0.01	0.11	79.00
932-P	7/25/47	2:10 a.m.	13 east return at room 2, 8 north parting entry	0.16	20.52	0.02	0.35	78.95
3574	7/25/47	3:40 a.m.	Main return at main shaft bottom	0.15	20.58	Trace less than 0.01	0.21	79.05
6215	7/25/47	3:40 a.m.	Duplicate of sample #3574	0.15	20.53	Trace less than 0.01	0.22	79.09
4654	7/25/47	2:25 a.m.	Face of room 2, 8 north parting entry	0.16	20.50	0.02	0.33	78.99
7257	7/25/47	2:00 a.m.	Face of room 1, 8 north parting entry	0.19	20.46	0.03	0.36	78.96

SUMMARY OF EVIDENCE

Because of the squeezed and caved condition of the 13 and 14 east entries inby the present active workings, it was only possible to get about 200 feet inby the 9 and 10 north and south panels with reasonable safety. Here the entries were squeezed down to about 4-1/2 feet in height, and it is believed that a relatively short distance beyond which it was possible to travel these entries that they were caved tight.

For a distance of 200 feet inby the 9 and 10 panels, it was observed that there were streamers of soot from the roof and deposits of coke on the floor, indicating slow burning of the gas and dust with little or no violence.

Inby the 9 and 10 panels, props that had been broken by the squeeze and which, therefore, would be easily dislodged had not been disturbed.

The absence of violence and the slow burning evidenced by the soot streamers on the roof is a phenomenon often observed in mines following explosions in tight ends where a balanced pressure builds up, such as in a room or entries inby the last crosscut, and substantiates the belief that the 13 and 14 entries were closed tight at some point beyond the 9 and 10 panels.

Outby the 9 and 10 panels, heavy deposits of coke were observed, indicating that coal dust entered into the explosion to a large extent, beginning at a point perhaps 100 feet outby the 9 and 10 entries. A build-up of pressure and violence toward the active workings was very apparent. Props and other material had been moved outby. This build-up of pressure and violence unquestionably was due to the ignition of fine coal dust.

As soon as the flame reached the active workings which had recently been thoroughly rock-dusted, a rapid diminution of both flame and violence took place. The further rapid diminution of pressure and violence outby along the 13 and 14 east entries was doubtless due to the release of pressure by expansion into the panel entries that were still open; namely, 7 and 8 north and south, and 5 and 6 north and south.

In view of the above observations it is believed by the investigators that the explosion originated in and was confined almost entirely to the area in which this investigation was conducted.

POSSIBLE CAUSES OF THE EXPLOSION

When the cross entries have been developed to their limit and the rooms off the panel entries have been completed, rooms are driven into the barrier pillars along the cross entries, starting at the inby end and working out, before the territory is abandoned and sealed. During the

period of time that is taken to complete this work, the worked-out areas squeeze and cave to the extent that these areas cannot be ventilated or inspected properly, although gas may accumulate extensively in the abandoned areas.

There was no doubt that the explosion was caused by an ignition of gas, but the actual source of ignition was not determined positively, although two such sources must be given serious consideration if we are to be sincere in the determination to prevent a recurrence of a disaster of this kind. First, the gathering locomotive was found on the inby end of the return-air side of the split and about 300 feet from the worked-out territory. The nip of the locomotive trailing cable was still connected to the trolley wire and could be construed as evidence that the locomotive was in operation. Reports to the effect that the controller on this locomotive was in the off position could be reasonably discounted, as the natural reaction of the operator when the explosion occurred would be to close the controller. The loading machine had broken down and was partly dismantled, the trailing cable was not connected to the power wire, and the men were loading the coal by hand. The mining machine was parked, and it was stated that no drilling was being done in the places.

Although the evidence points to the fact that the gas was ignited by the locomotive operating at 8 north, the possibility that it was ignited by someone smoking cannot be entirely dismissed. One of the recovery crews about to enter the mine was cautioned against carrying any matches or cigarettes into the mine, and the men deposited numerous packages of cigarettes and matches that they had been carrying in their working clothes at the collar of the shaft, which indicates that the men had been in the habit of carrying smokers' articles into the mine. Even in those mines in Illinois where smoking has been prohibited, it has not been a practice to search the men for smokers' articles before they enter the mine.

The abandoned area inby and immediately adjacent to the last working places off the entries could have contained heavy accumulations of methane that could easily be forced out into the active workings by a fall of roof in any part of the vast expanse of abandoned workings, by a slight change in barometric pressure, or by restoring the ventilation after it had been disrupted by keeping one of the doors open for an excessive length of time.

It was quite obvious to the men engaged in the recovery operations that the abandoned area adjacent to the active workings was squeezing and caving at that time and undoubtedly had been during the day, and it is an undisputed fact that the liberation of methane becomes more active when caving and squeezing occur.

Therefore, it was concluded by the Bureau men engaged in the recovery work and investigation that some accumulated gas had been forced into the active working area, or that gas had accumulated in the working

section due to an extended disruption of the ventilating current, where it was ignited by a spark or arc from the gathering locomotive, or possibly by one of the workmen smoking.

The State Mining Board issued a preliminary statement to the effect that an accumulation of gas in the abandoned area was ignited in some unknown manner to cause the explosion. However, the Bureau investigation and subsequent statements of the survivors would seem to indicate that this preliminary statement will be revised in the final report.

Following are the statements of the three men who survived the explosion in the 13 and 14 east entries of the Old Ben Coal Corporation No. 8 mine, July 24, 1947, obtained July 30, 1947.

Statement of Frank Casper, West Frankfort, Illinois, motorman for servicing the loading machine: "As the loading machine was broken down, I decided to walk out of the room to see what was going on in the rest of the section. When I reached the entry switch, I saw the gathering locomotive up at the 8 south entry changing cars for the hand loaders. As I was looking up the entry, I saw a ball of fire start at the locomotive and the fire came down the 13 east entry from the 8 south. I fell to the ground and there was a loud report like a shot, and when the fire reached me it was making a swishing sound. I was picked up by the force and thrown down the entry. The lens and globe in my electric cap lamp were destroyed so I was in the dark. I found one rail and followed it down the entry until I came to a crosscut on the left side. I crawled through the crosscut and came to fresh air and decided to stay there. The first men to reach me were James Rainey, the motor boss, and Don Bowker, the mine manager, and when they arrived I walked out to the mouth of the entry with assistance.

"I did not hear the drill or machine running, but I did hear the locomotive running up at the 8 south switch.

"We had gas up around the 9 and 10 north entries when we were working in the pillars there."

Statement of Charles Smith, West Frankfort, Illinois, gathering locomotive operator: "I had exchanged locomotives with Curtis Stagner, the relay motorman, and in company with Thomas Kirby, the main-line motorman, I was sitting on Stagner's locomotive. After some switching, Stagner had just changed the three hand loaders in the rooms off the 13 east parallel entry. As I was watching him come out on the 13 east entry, I saw a ball of fire and a second later I heard a swishing sound, and Kirby and I were thrown off the locomotive and landed outby it. We were in the dark, as the headpieces of our electric cap lamps were destroyed. I told Kirby that we had better get into the intake air course and started to crawl along the rail. I found a stopping, but there was no opening

in it. I called to Kirby and he said that he could not make it any further, so I told him to stay there and I would see if I could find a crosscut with an opening in it. I started to crawl up the entry, but lost consciousness and do not remember anything more until I woke up in the hospital.

"The machine and drills were not being operated at the time of the explosion.

"My belief is that the locomotive that Stagner was running ignited the gas at 8 south off 13 east entry."

Statement of Thomas Kirby, West Frankfort, Illinois, main-line locomotive operator: "Charles Smith and I were sitting on Stagner's locomotive at 6 north off 13 east entry. We saw Stagner switching around with his locomotive at 8 south off 13 east and saw a ball of fire. We only had time to turn our heads when we heard a swishing sound and we were thrown off the locomotive. We talked about getting into the intake air course, and then I lost consciousness.

"I really believe that the locomotive that Stagner was operating at the 8 south off 13 east ignited the gas."

LESSONS TO BE LEARNED FROM THE CONDITIONS AS THEY RELATE TO THE EXPLOSION

1. The outstanding lesson to be learned from this disaster is that the practice of working places adjacent to open, abandoned sections where gas may accumulate is extremely dangerous. Abandoned workings should be ventilated properly and inspected frequently, or they should be sealed.

2. Where single doors are used to control ventilation, all precautions should be taken to see that the doors are not kept open for an extended period of time.

3. It is of paramount importance that the officials in a gassy mine keep their flame safety lamps with them at all times and make frequent examinations for gas in the working places.

4. The practice of smoking in gassy mines, surreptitiously or otherwise, must be discontinued, if mine disasters are to be avoided.

5. Searching employees for smokers' articles before they enter the mine should be considered by the men to be an essential safeguard, rather than a violation of personal rights, and it should be done at all mines where smoking underground is prohibited.

6. Bags of rock dust suspended from timbers were proved to be ineffective insofar as preventing propagation of the explosion, as most of the bags did not trip and the rock dust was not dispersed into the atmosphere.

RECOMMENDATIONS

Recommendations concerning the safe operation of this mine were made in reports of previous Federal inspections, the last inspection having been made January 7-10, 1947. Recommendations in this report, therefore, are limited to conditions as they related to explosion hazards.

Recommendations Based on the Federal Mine Safety Code for Bituminous-Coal and Lignite Mines of the United States

ARTICLE V - VENTILATION AND MINE GASES

Section 9b. Abandoned workings should be sealed or ventilated.

Section 10c. Mine officials whose regular duties require them to inspect working places should have in their possession, when underground, a permissible flame safety lamp in safe working condition.

ARTICLE VI - COAL AND ROCK DUST

Section 1b. Where mining operations raise an excessive amount of dust into the air, water or water with a wetting agent added to it or other effective methods should be used to allay such dust at its source.

ARTICLE VIII - ELECTRICITY

Section 9d. Where nonpermissible electric equipment is being used, care should be taken to protect the workmen by making frequent examinations of the air for methane content and by preventing interruptions of the ventilating current.

Section 9f. In all face workings where electrically driven equipment is operated, frequent inspections for methane should be made. If a dangerous condition exists, the machines should be stopped until such dangerous condition is removed.

ARTICLE XI - MISCELLANEOUS

Section 6a. Because of explosion and fire hazards, matches or other flame-making devices should not be carried into the mine.

SUPPLEMENTAL RECOMMENDATIONS NOT SPECIFICALLY COVERED BY THE FEDERAL MINE SAFETY CODE

1. In any section of a mine liberating an excessive amount of methane, or in a section being worked adjacent to an abandoned area that might contain accumulations of methane, the doors controlling the ventilation should be built in pairs to form air locks or single doors should be attended.

2. Air that has passed by abandoned areas that cannot be inspected should not be used to ventilate active workings.

3. In mines where smoking has been prohibited, workers should be searched for smokers' articles before they enter the mine.

4. In sections of a mine known to be definitely gassy, where the active workings are adjacent to large areas of unsealed abandoned workings, the active workings should be ventilated by intake air and only permissible electric equipment should be used.

ACKNOWLEDGMENT

The writers acknowledge the courtesies extended and the help given by officials of the Old Ben Coal Corporation, members of the United Mine Workers of America, and representatives of the Illinois Department of Mines and Minerals, who gave, without reservation, all information requested in connection with this investigation.

Respectfully submitted,

(Signed)

W. A. Gallagher
Coal-Mine Inspector

(Signed)

W. R. Chick
Coal-Mine Inspector

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Coal-Mine Inspector

Approved:

(Signed)

C. A. Herbert
Supervising Engineer, District E

(Signed)

J. J. Forbes, Chief
Coal-Mine Inspection Division

D. Harrington, Chief
Health and Safety Branch

APPENDIX C

List of Men Killed in Mine Explosion No. 8 Mine, Old Ben Coal Corporation
July 24, 1947

Name	Age	Birth Date	Social Security No.	Address	Occupation	Married or Single	Dependents	Total
George Raymond	60	4/16/87	[redacted]	402 East 6th St. West Frankfort, Ill.	Clean Up	Single	None	
Gustave Gaubautz	48	6/5/99	[redacted]	R. F. D. #2 West Frankfort, Ill.	Clean Up	Married	Wife	1
J. Marion Childers	74	12/3/73	[redacted]	1401 E. St. Louis St. West Frankfort, Ill.	Clean Up	Married	Wife	1
Louis F. Owens	51	10/22/96	[redacted]	1209 Peterson St. Johnston City, Ill.	Cutting Machine	Married	Wife	2
Willis Hilliard	41	2/2/06	[redacted]	801 E. Reeves St. Marion, Illinois	Cutting Machine	Married	Wife	7
James T. Wilson	37	7/19/10	[redacted]	1208 E. Poplar St. West Frankfort, Ill.	Loading Mch.Oper.	Married	Wife	3
Raymond C. Stevens	32	7/9/15	[redacted]	305 N. Ward St. Benton, Illinois	Ldg.Mch. Helper	Married	Wife	3
Robert W. Wicker	62	6/20/85	[redacted]	608 S. Cherry St. West Frankfort, Ill.	Cleaning Cuts	Married	Wife	1
Willie Ray Smith	46	2/27/01	[redacted]	Thompsonville, Ill.	Driller	Married	Wife	1

APPENDIX C - (Continued)

Name	Age	Birth Date	Social Security No.	Address	Occupation	Married or Single	Dependents	Total
Adolph Nickelvich	36	5/18/11	[redacted]	1105 E. Clark St. West Frankfort, Ill.	Driller	Married	Wife	2
George D. Griffith	41	11/20/06	[redacted]	702 E. Garland St. West Frankfort, Ill.	Asst. Mine Manager	Married	Wife	2
Curtis O. Stagner	43	2/2/04	[redacted]	R. F. D. #1 West Frankfort, Ill.	Motorman	Married	Wife	2
Horace M. Walton	44	1/24/03	[redacted]	304 E. Dewey St. West Frankfort, Ill.	Trip-rider	Single	Mother	1
John Peter Yattoni	32	6/30/15	[redacted]	404 N. Adams St. West Frankfort, Ill.	Trip-rider	Married	Wife	2
John Sebben	57	4/14/90	[redacted]	1121 Benton St. Johnston City, Ill.	Timber-man	Married	Wife	2
Celesta Berra	60	4/12/87	[redacted]	320 N. 13th St. Herrin, Ill.	Timber-man	Married	Wife	1
Thomas McPheron	64	1/4/83	[redacted]	1208 Grand Avenue Johnston City, Ill.	Timber-man	Married	Wife	2
Hiram B. Chitwood	22	12/25/25	[redacted]	602 Fourth St. Johnston City, Ill.	Track-layer	Single	Mother	1

APPENDIX C - (Continued)

Name	Age	Birth Date	Social Security No.	Address	Occupation	Married or Single	Dependents	Total
Domenico Piacentini	67	6/18/80	[redacted]	701 S. Short St. West Frankfort, Ill.	Track-layer	Married	Wife	1
Giles C. Summers	46	9/9/01	[redacted]	R. F. D. #1 Benton, Ill.	Track-layer	Married	Wife	1
Gus Garland Grant	59	10/9/88	[redacted]	705 W. 8th St. Johnston City, Ill.	Track-layer	Married	Wife	1
Arthur Fritts	29	9/12/18	[redacted]	302 Illinois Ave. West Frankfort, Ill.	Track-layer	Married	Wife	3
Louis Marlow	43	2/27/04	[redacted]	401 W. 16th St. Herrin, Illinois	Track-layer	Single		1
Thomas F. Boyer	25	8/23/22	[redacted]	109 N. Dorris St. West Frankfort, Ill.	Track-layer	Married	Wife	2
Peter DeJulius	42	2/22/05	[redacted]	319 E. Dewey St. West Frankfort, Ill.	Electri-cian	Married	Wife	6
Herbert Don Bidwell	49	9/15/98	[redacted]	1400 E. Ninth St. West Frankfort, Ill.	Elect.	Married	Wife	1
Thomas M. Palmer	41	12/29/06	[redacted]	107-1/2 S. Logan St. West Frankfort, Ill.	Trip-rider	Single Divorced	Child	1

APPENDIX D

List of Men Injured in Mine Explosion No. 8 mine, Old Ben Coal Corporation
July 24, 1947

Name	Age	Birth Date	Social Security No.	Address	Occupation	Married or Single	Dependents	Total
Frank Casper	43	5/2/04	[redacted]	2106 E. Clark St. West Frankfort, Ill.	Motorman	Married	Wife	2
Charley Smith	36	4/14/11	[redacted]	502 S. Douglas St. West Frankfort, Ill.	Motorman	Married	Wife	4
Thomas Kirby	41	3/2/06	[redacted]	R. F. D. #2, Box #44 West Frankfort, Ill.	Motorman	Married	Wife	3

APPENDIX E

Supplemental Statement by Mr. C. A. Herbert, Supervising Engineer, Vincennes, Indiana.

In the report on the explosion at No. 8 mine, Old Ben Coal Corporation, West Frankfort, Illinois, on July 24, 1947, under the heading "Possible Causes of the Explosion" the following statement is made:

> "Although the evidence points to the fact that gas was ignited by the locomotive operating at 8 north, the possibility that it was ignited by someone smoking cannot be entirely dismissed."

Mr. C. A. Herbert's supplemental statement contains the following:

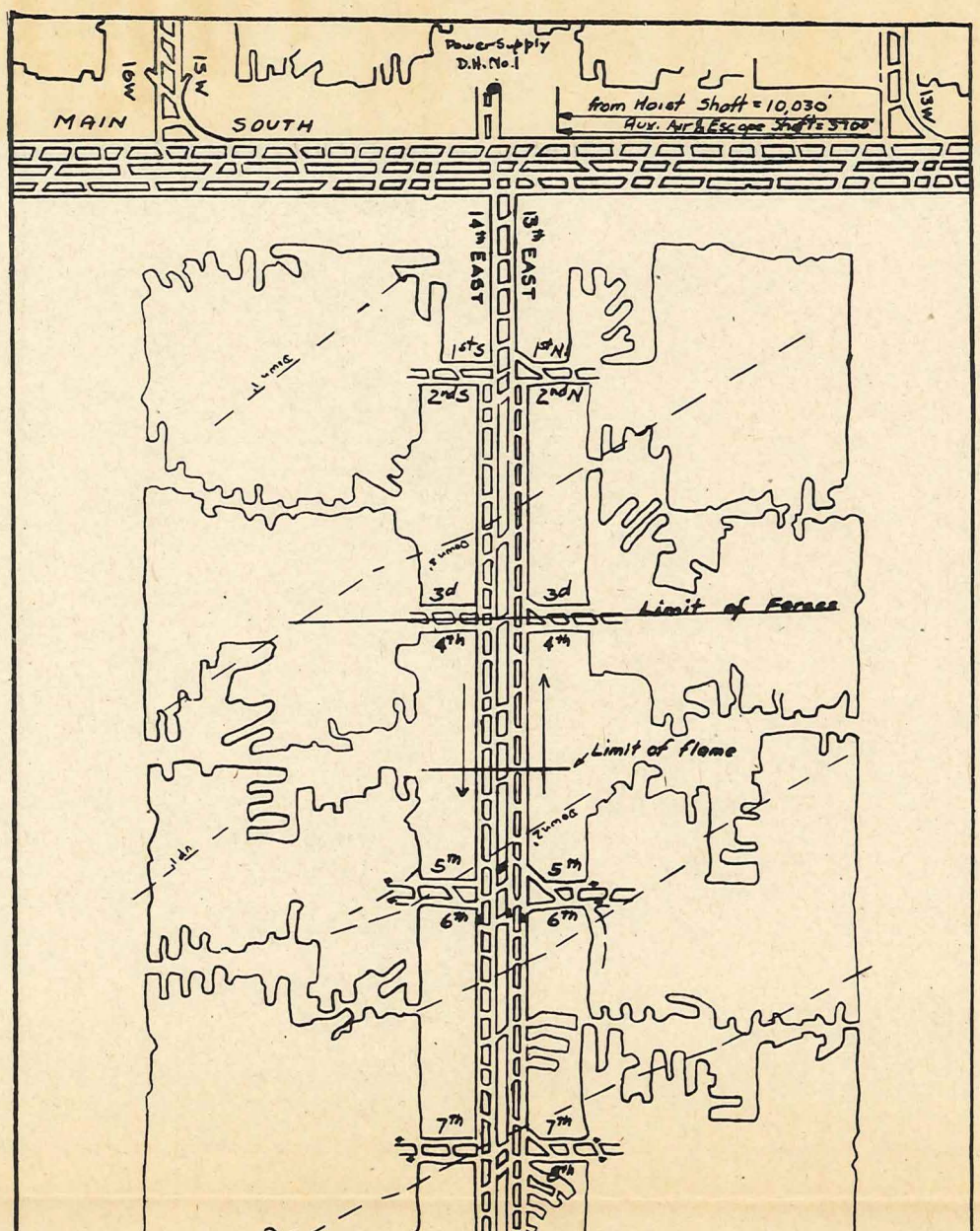
> "The above statement, concerning smoking as a possible source of ignition in the Old Ben Coal Corporation's No. 8 mine explosion report, is justified from the facts obtained during the investigation, from intimate knowledge of practices in the Illinois coal field, and from evidence obtained from previous inspections at this mine and other mines in southern Illinois where smoking is practiced surreptitiously in gassy mines.
>
> "The following facts would seem to bear out the assumption that there was a possibility that smoking might have caused the ignition; therefore, the statement that it should not be entirely dismissed was placed in the report.
>
> "A reinspection report on the No. 8 mine dated August 21-24, 1945, included a recommendation as to smoking. This same recommendation was repeated in the inspection report dated May 14-17, 1946. Company officials also state that they have found evidence of smoking on numerous occasions in this mine.
>
> "It will be noted in the explosion report that the Old Ben No. 8 employees, when requested to search themselves, deposited smokers' materials that were in their working clothes at the shaft collar when they were about to enter the mine to take part in the recovery operations, indicating conclusively that it was general practice to carry smokers' articles into the mine.

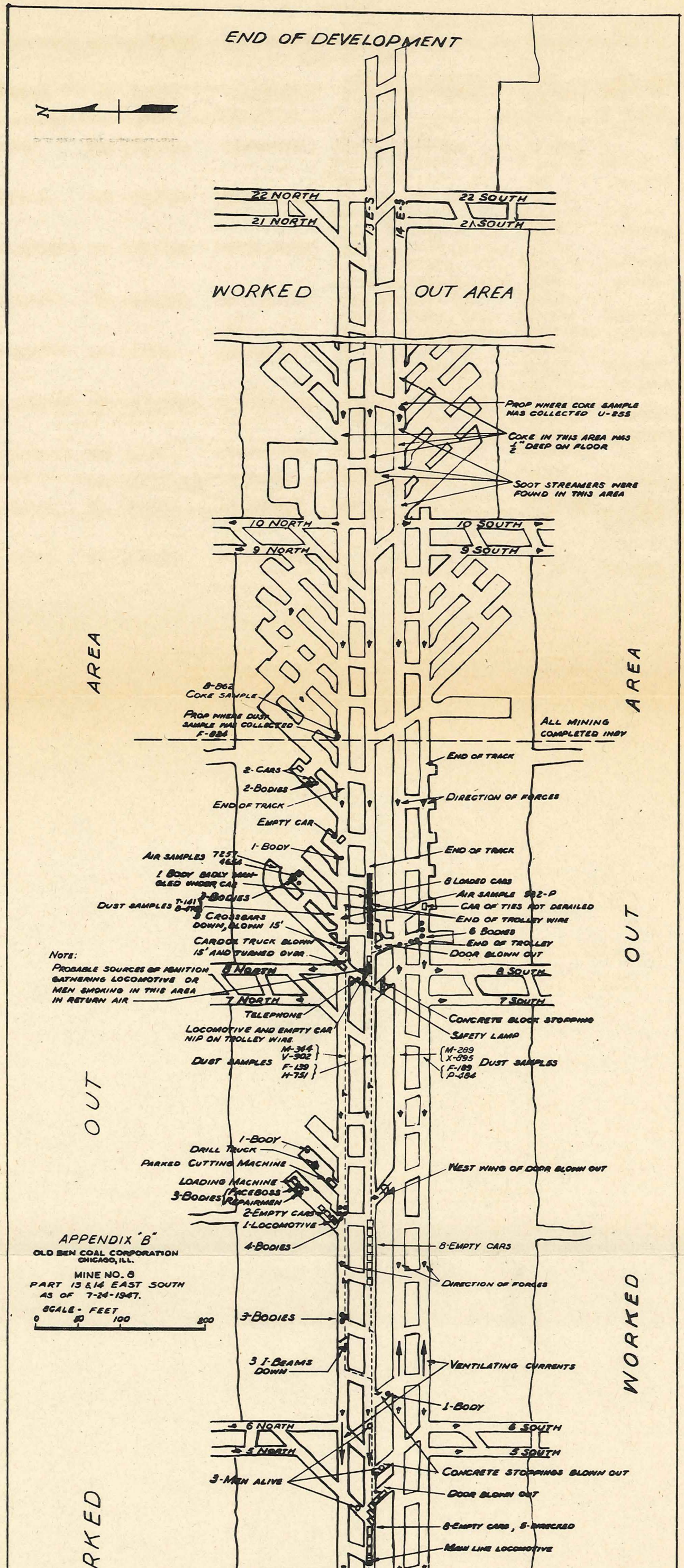
"An interview with Mr. David Clayton, Coroner, Franklin County, Illinois, after the explosion report was transmitted, revealed that about 50 percent of the victims of the disaster had matches and cigarettes on their persons. He stated further that during his 20 years as Coroner of Franklin County, he had repeatedly found matches and cigarettes on the bodies of victims over whom he has held inquests.

"Searching the men for smokers' articles has not to our knowledge been practiced in the State of Illinois until recently. Since the explosion at the Old Ben No. 8 mine, the company reports that they are now searching their workmen and no resistance has been offered from the men, who evidently now realize the importance of this safety measure.

"It is no discredit to the survivors to say that they could not have been close enough to the point where the explosion was initiated and lived, to discern whether or not the gas was ignited by a spark or arc from the locomotive or by a man lighting a match to smoke.

"The inspectors have been instructed to cover every possibility in making their investigations and in writing any explosion report. To consider anything less than this would seem unethical to those sincerely interested in the safety of those who work in coal mines."


Power Supply
D.H. No. 1
from Hoist Shaft = 10,030'
Aux. Air & Escape Shaft = 5700'
MAIN
SOUTH
16W
15W
15W
14th EAST
13th EAST
1st S
1st N
2nd S
2nd N
3d
3d
Limit of Fence
4th
4th
Limit of Flame
5th
5th
6th
6th
7th
7th


END OF DEVELOPMENT
N
22 NORTH
21 NORTH
22 SOUTH
21 SOUTH
13 E-S
14 E-S
WORKED OUT AREA
PROP WHERE COKE SAMPLE WAS COLLECTED U-855
COKE IN THIS AREA WAS 1/2" DEEP ON FLOOR
SOOT STREAMERS WERE FOUND IN THIS AREA
10 NORTH
9 NORTH
10 SOUTH
9 SOUTH
AREA
AREA
B-862 COKE SAMPLE
PROP WHERE DUST SAMPLE WAS COLLECTED F-884
ALL MINING COMPLETED INBY
END OF TRACK
2-CARS
2-BODIES
END OF TRACK
DIRECTION OF FORCES
EMPTY CAR
1-BODY
END OF TRACK
AIR SAMPLES 7257 4624
1 BODY BADLY MANGLED UNDER CAR
8 LOADED CARS
AIR SAMPLE 592-P
3-BODIES
DUST SAMPLES T-141 B-176
CAR OF TIES NOT DERAILED
END OF TROLLEY WIRE
3 CROSSBARS DOWN, BLOWN 15'
6 BODIES
CAR OF TRUCK BLOWN 15' AND TURNED OVER
END OF TROLLEY
DOOR BLOWN OUT
NOTE:
PROBABLE SOURCES OF IGNITION GATHERING LOCOMOTIVE OR MEN SMOKING IN THIS AREA IN RETURN AIR
8 NORTH
8 SOUTH
7 NORTH
7 SOUTH
TELEPHONE
CONCRETE BLOCK STOPPING
LOCOMOTIVE AND EMPTY CAR NIP ON TROLLEY WIRE
SAFETY LAMP
DUST SAMPLES M-344 V-902 F-139 H-751
M-289 X-895 F-189 P-284 DUST SAMPLES
OUT
OUT
1-BODY
DRILL TRUCK
PARKED CUTTING MACHINE
WEST WING OF DOOR BLOWN OUT
LOADING MACHINE
3-BODIES FACEBOSS REPAIRMEN
2-EMPTY CARS
1-LOCOMOTIVE
4-BODIES
8-EMPTY CARS
DIRECTION OF FORCES
APPENDIX "B"
OLD BEN COAL CORPORATION
CHICAGO, ILL.
MINE NO. 8
PART 13 & 14 EAST SOUTH
AS OF 7-24-1947.
SCALE - FEET
0 50 100 200
3-BODIES
3 I-BEAMS DOWN
VENTILATING CURRENTS
1-BODY
6 NORTH
6 SOUTH
5 NORTH
5 SOUTH
3-MEN ALIVE
CONCRETE STOPPINGS BLOWN OUT
DOOR BLOWN OUT
8-EMPTY CARS, 8-WRECKED
MAIN LINE LOCOMOTIVE
WORKED
WORKED