FINAL REPORT - COAL DUST EXPLOSION
YUKON MINE, CROWN COAL COMPANY
ARNETTSVILLE , MONONGALIA COUNTY, W. VA.

By

R. D. Currie

Associate Mining Engineer

DEPARTMENT OF COMMERCE
BUREAU OF MINES

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FINAL REPORT - COAL DUST EXPLOSION YUKON MINE, CROWN COAL COMPANY ARNETTSVILLE, MONONGALIA COUNTY, W. VA. MARCH 26, 1930

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U. S. Department of Commerce
Bureau of Mines

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Appendix

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YUKON MINE, CROWN COAL COMPANY
ARNETTSVILLE, MONONGALIA COUNTY, W. VA.
MARCH 26, 1930

A coal dust explosion occurred in the Yukon mine of the Crown Coal Co., Arnettsville, W. Va., about 2:06 a.m., March 26, 1930, in which 12 men lost their lives. The explosion was local in extent, involving only the 9 Right - 1 main entry and workings, although some pressure was exerted on ventilation doors on the left of 1 main entries. The explosion was probably caused when a large pillar fall caused a cloud of coal dust, perhaps together with a small percentage of methane, to come in contact with sparks or arcs from a cable reel locomotive. Rock-dust is not used in this mine to reduce the explosibility of the coal dust, nor is water used in wetting down the dust.

The Bureau of Mines was notified of the explosion through the Associated Press at about 7:00 a.m. Two Bureau engineers left Pittsburgh at about 8:00 a.m. and arrived at the mine at about 10:30 a.m., where they assisted in the recovery operations. Car 3, which was located at Avella, Pa., was ordered to proceed to the explosion at 7:40 a.m., but was recalled at 12:10 p.m. when it was known that the explosion was local in extent and the affected area would probably be recovered that day.

Location and Ownership:

Yukon mine is located at Arnettsville, Monongalia County, West Virginia, about midway between Morgantown and Fairmont. The mine is served by a branch of the Monongalia Railroad, with the shipping

point at Lowesville, W. Va. The mine is owned and operated by the Crown Coal Company, a subsidiary of the Imperial Coal Corporation, with general offices in Johnstown, Pa.

Officers:

Pres. and Gen. Mgr.	C. A. Owen	344 Madison Ave., New York City
General Supt.	J. M. Cook	705 Johnston Trust Building, Johnstown, Pa.
Asst. General Supt.	J. L. Evans	do
Mining Engineer	W. H. Hinks	do
Mine Foreman	R.C.Klingensmith	Arnettsville, W. Va.

Employees and Production:

The mine employs a total of about 200 men inside and outside the mine as follows:

Loaders	125 daylight
Loaders	20 night
Laborers inside	28
Laborers outside	27

The daily production averages twelve to fifteen hundred tons with a maximum of 1800 tons and an annual production of 410,000 tons in 1929.

Openings:

The mine is opened by a slope 487 feet long on about a 33° pitch, which is used as manway, intake airway and hoisting-way. A vertical shaft 158 feet in depth is used as the upcast airway and emergency escape way.

Coal Bed:

The Sewickley coal bed is being worked in this mine. The coal

averages 6 feet in thickness, is of bituminous rank, rather hard, bright, and has a blocky fracture. The face cleats have a bearing of N. 80° W., and while well defined, are not as pronounced as those found in the Pittsburgh coal. The butt cleats are normal to the faces but are not prominent.

In mining, about 5 inches of laminated coal and shale BOTTOM is left down in rooms and air courses but is taken up in haulageways. The only other impurity that persists throughout the mine is a thin shale parting, varying from a knife edge to an inch in thickness, about 3-1/2 feet from the roof.

Analyses of Coal:

The following analyses of the Sewickley coal bed in Monongalia and Marion Counties taken from Technical Paper 405, "Analyses of West Virginia Coals," show that this is a high volatile coal.

	Monongalia Co.	Marion Co.	
Moisture	1.2	1.8	.6
Volatile	36.0	37.9	38.6
Fixed Carbon	52.3	50.4	52.1
Ash	10.5	9.9	8.7
Sulfur	1.8	4.0	4.0
B.t.u.s.	13,380	13,310	13,600

Roof:

The roof in the Yukon mine consists of shales and sandstone. The roof over a great portion of the mine is apparently a fossiliferous sandy shale which contains thin laminations of coal in places. This roof was found in most of the falls inspected during this investigation. The sandstone, however, was found in the higher falls.

Floor:

The floor underlying the Sewickley coal is a hard blue shale

that disintegrates slightly in the presence of moisture. The floor has a tendency to heave slightly both in advance work and in pillar sections.

Surface Plant:

The surface plant consists of a wooden tipple containing a Phillips single car, gravity type, rotary dump and O. L. Miller reciprocating shaker screens which separate the coal into the following sizes: Lump, nut and slack.

The coal is picked on these screens and refuse hauled to the refuse dump by an electric lorry.

The coal is hoisted from the mine in trips of from 4 to 6 cars by a Vulcan, Electric, 250 h.p., 2300 volt hoist. This hoist is fitted with an indicator and hand operated brake.

The fan house, machine shop, office, engine house and other outside buildings, except the tipple, are constructed of concrete block and present a very neat appearance in addition to being fire-proof.

Manway:

The manway leading into the mine is along one side of the haulage slope and is separated from the hoisting compartment from the entrance to about 50 feet inby by a concrete curtain wall, beyond that there is no separation.

The slope is about 487 feet long on about a 30 degree pitch. A poorly constructed and poorly maintained hand rail is provided along the manway, but no steps are provided and the walkway is rough, steep and covered with loose material which presents a great many hazards to men traveling it.

Method of Mining:

The mine has been developed on the room and pillar system, having two main entry systems to the left of the slope, each consisting of 4 parallel entries driven on 50 feet centers. Owing to the shape of the property, these entries, with the exception of the first 3,000 feet of the First Left mains, have been driven quartering the face cleats. An exception is on First Left mains which have been driven very nearly on the faces. Off these, butt entries, driven double and triple, have been turned 400 feet apart, except beyond 10 Right where they are being turned on 325 feet centers. The mining method has been changed from time to time as will be noted on the map of the mine to be found in the appendix.

The new developments and projections call for a full retreat system.

Considerable difficulty has been experienced in controlling the roof, and many of the entries and rooms have caved. To recover the development lost through caving, "skins" are driven paralleling the last entries or rooms. These skins are driven with very little to no pillar between them and the caved portion and the roof in them is generally sound, requiring no unusual amount of timbering.

Owing to the many falls in rooms and pillars the pillaring has been very haphazard.

Cutting:

The coal is undercut with 7 shortwall and 1 arcwall mining machines. The cutting is done above the "sheep skin" which is a shale parting separating the bottom 5 inches of laminated coal from the rest of the bed.

The cutting equipment consists of 5 Goodman, permissible type,

Type 112 EJ; 2 Goodman, closed type (unapproved); 1 Jeffrey (unapproved) arcwall type 29-C.

Condition of Machines:

Two of the approved type machines were observed in the mine and neither of them were in permissible condition. In one case only two bolts were holding the controller box lid, leaving eight bolt holes and about 1/4 inch gap along the joint. Numerous poorly made splices were observed in one of the machine cables. One approved type machine in good condition was observed in the machine shop.

No junction boxes are provided, but all machines are equipped with "nipping" poles consisting of a long piece of copper wire attached to a wood handle.

Water is not used on the cutter bars of mining machines while they are undercutting the coal, nor is any attempt made to wet down the "bug-dust" or machine cuttings.

Long handled flat shovels were observed in several places for removing the cuttings from the kerf but this practice is apparently not general.

Explosives:

The explosive used in this mine is Hercoal C, 1-1/4" x 8" detonated with Western No. 6 electric detonators and dry-cell batteries.

The Western electric detonators are unique in that each detonator comes fitted in a pasteboard shell around which the legs are tightly wrapped, keeping the detonators well protected from contact with each

other. The legs are short-circuited by being twisted at their ends. No shot-firers are employed, the miners all firing their own shots with dry cell batteries at any time during the working shift. Shots are tamped with fine coal in most cases, although clay was observed in a few places.

Haulage Equipment:

The haulage equipment consists of

1 - 13 ton Jeffrey main line trolley type Locomotive.

5 - 6 ton Goodman cable reel trolley "closed-type" gathering locomotives.

2 - 6 ton Ironton unapproved storage battery locomotives.

250- 3.3 ton capacity Solid Body steel mine cars, with Timkin roller bearings and 2 wheel brakes.

Tracks:

The track on the slope consists of an empty and loaded track which overlap each other and are placed on the same set of crossties. The center lines of these two tracks are offset about 6 inches. The loaded track is equipped with spring-latch derails at each rail length from a point about half way up the slope to the portal. The empty track has no derailing devices. The derails on the loaded track are not being maintained in working condition.

The track on main entries where hauling is done with the 13 ton locomotive is laid with 40 pounds per yard rails, except on 5 Right which is used as the crossover from 1 main to 2 main where 60 pound per yard rails are used. Butt entries are laid with 30 pound per yard rails, while 20 pound per yard rails are used in rooms, air courses and pillars.

The condition of the track throughout the mine is fairly good,

although the rails used are too light, except in 5 Butt Right off 1 main, for the work they are intended to do.

The track was very dirty throughout the mine and adequate clearance alongside the track was apparently given no consideration when the tracks were laid.

Trolley and Power Lines:

The power lines enter the mine through the vertical shaft in insulated cables. This shaft is the return airway for the entire mine.

The trolley lines throughout the mine have been installed with little, if any, thought to safety. Trolley hangers are too far apart in many places; too much sag is allowed in the wire between hangers, and the trolley lines do not follow the contour of the tracks. Section cut-out switches are provided at each butt entry. The handles on these cut-out switches in some cases are placed on the "close side" making it necessary to reach or pass under the wire to pull the switch handle. The wire at cut-out switches should be well guarded.

Three phase, 220-volt, A.C. power lines have been installed on the clearance side of the haulage road from the slope bottom to the pump near 5 right butt. This line is a three conductor cable in places but most of it is three separate, insulated wires. Only armored cable should be installed on the clearance side.

A heavy cable feeder line is carried on the trolley side of the haulage road. This cable is about a 250,000 circular mil cable and was loosely supported from roof hangers, ribs and posts.

Trolley Guards:

Trolley guards are few and far between in this mine; only one guard was noticed on 1 main, and two or three on 2 main entries. Dozens of places were observed throughout the mine where it was necessary for men to pass under

bare trolley wire which was less than 6-1/2 feet above the rail. No trolley guards are provided at any of the ventilating doors, where it is necessary for men to reach under the wire to open the doors.

Bonds:

The tracks throughout the mine are bonded with flexible copper bonds welded to the base of the rails. Main tracks are bonded on both sides and cross bonded at frequent intervals. Butt entry tracks are bonded on one side only. The bonds in 9 Right off 1 main were observed closely and several broken bonds were found. This would introduce a high resistance in the electric circuit of locomotives and machines operating in this entry and present a fire hazard in case of short-circuit of the trolley line.

Ventilation:

The ventilation is induced by a Robinson Type A, 5 ft. 3 in. by 3 ft. fan working exhausting. The fan is located at the edge of the 158 foot circular shaft and is equipped with explosion and reversing doors. The fan is driven by a belt from a 40 H. P., 2200 volt, A. C. motor, and at the time of this investigation, was circulating about 65,500 cubic feet of air per minute against 1.5 inches of water. No auxiliary drive is provided for the fan, however, a duplicate motor is provided in the fan house which can be used to replace the fan drive motor in the event it needs to be repaired.

A recording pressure gage is provided at the fan, but there is no signal device to give warning if the fan stops or slows down.

At the time of the explosion the air was conducted through the mine in two primary splits. The full volume of air entered the

slope and traveled inby on the haulage road of 1 south main to 5 Right where it split; part passing along 5 Right to ventilate the workings to the right of 2 South mains, the greater portion following along 1 South main haulage road to the inby end where it split to the right and left. The right split ventilated the workings to the right of 1 main from 12 butt back to 9 butt by percolation; the left split ventilated the entire left side of 1 main workings and returned to the upcast shaft through the entries back of the slope.

No. 2 split, or that part of the air entering 2nd South mains by 5 Right off 1 main, followed the haulage road of 2 main to its inby end, where it joined with the secondary split from No. 1 mains. This air then ventilated all of the right butts off 2nd mains and returned to the foot of the upcast shaft where it joined with the air from the left of No. 1 mains.

Quantity of Air:

Air measurements taken during this investigation were as follows:

	Cu. ft. per minute
Full return - at fan	65,500
2nd Section return - outby 9 Right - 2nd mains	19,440
Right Secondary split - 1 mains at 8 Left - 2nd mains	6,240

Changes in the Ventilating System:

Following the explosion and before the mine was permitted to resume operations the ventilating system was re-arranged as follows:

A partly completed overcast at 5 Right, 1 main, was completed

and put into operation. This overcast carries the return air from those workings lying between 1 main and 2 main. The effect of this change consisted in making secondary splits of 2nd main split, and using the Right secondary split from 1 main and the Left secondary split from 2 main to ventilate the room and pillar workings lying between these two mains.

Air measurements taken by the writer following these changes were as follows:

	Cu. ft. per minute
Full return - at foot of upcast shaft	65,400
2nd main - Right secondary split - at 4 Right 2 main	15,370
1st main - Left secondary split - near fan shaft	22,860
Return at overcast (called 3rd split by officials)	21,105
(1 main Right secondary plus 2 main Left secondary splits)	

Explosive Gas:

This mine is rated as gassy by the West Virginia Department of Mines. No open lights, matches, or smokers' articles are permitted in the mine. Closed lights are used for illumination and key-locked flame safety lamps are used for testing and inspecting the mine.

Fire bosses are employed to examine the mine in the morning before the day shift is allowed to enter.

Air samples were taken in the mine both before and after the changes were made in the ventilating system. Complete analyses of these samples will be found in the appendix. The following tabulation gives the results of these analyses in brief:

TABLE 1

Bottle Number[a]	Location of Mine	Quantity of Air Per Min.	Percentage[a] CO_2	O_2	CH_4	N_2	Approximate Cu. Ft. CH_4 Per 24 Hrs.	Equivalent in Cu. Ft. of Fire Damp at Lower Explosive Limit
314	Full return at fan	65,000	.09	20.64	.25	79.02	234,000	4,680,000
313	do	65,000	.10	20.65	.22	79.03	206,000	4,120,000
312	2nd sec. ret. 9 rt.	19,440	.09	20.69	.27	78.95	75,585	1,511,700
308	8th Left 2nd mains	6,240	.11	20.56	.43	78.90	38,600	772,000
309	9 L 2nd sec. Part return	Not Measurable	.11	20.66	.38	78.85	—	—
307	Last place - 7 L stumps	do	.16	20.25	.13	79.46	—	—
311	10 Room 8 rt. 1 main	do	.03	20.65	.09	79.18	—	—
310	15 room 8 rt. at fall	do	.14	20.46	.36	79.04	—	—
303	Full ret. at fan shaft	65,400	.11	20.55	.23	79.11	216,000	4,320,000
304	2nd sec. ret. 2 rt. 2nd sec.	6,000	.10	20.73	.33	78.84	28,500	570,000
305	3rd split ret. at overcast	21,105	.12	20.47	.26	79.15	78,000	1,560,000
306	1st split ret. 15 room 2nd L.	4,294	.14	20.57	.24	79.05	14,850	297,000

(a) Samples collected by Currie, Marshall and Walker.
Analyzed by W. P. Yant.

It will be seen from these analyses that this mine is liberating about 220,000 cubic feet of methane every 24 hours. That is enough methane to completely fill about 7 miles of mine entry with an explosive mixture at its maximum explosive point, or about 14 miles of entry with a mixture of gas at its lower explosive limit.

Dust:

The coal dust in the Yukon mine is very explosive, being similar to the dust of the Pittsburgh coal bed. All haulageways, airways and working places visited, with few exceptions were dry and dusty. There are a few places in the mine where there are water accumulations but these are insignificant compared with the dry and dusty areas.

No attempt is made to minimize the dust caused by the mining operations by the use of water on the cutter bar of mining machines, for wetting down the working places, or sprinkling the loaded cars.

There is evidence that at some time a part of 1 South main haulage road was given a coat of rock-dust. This, without similar protection throughout the mine, including haulageways, airways, rooms, pillars and other open parts of the mine to within 40 feet of the working faces, offers little, if any, protection.

Dust Samples:

Considering the above circumstances, it was felt that a complete sampling of the dust in the entire mine was unnecessary. Samples of dust from four points, however, were taken and the complete analyses of these eight samples (four rib and roof and four road) will be found in the appendix of this report. The following tabulation gives the

details of these analyses in brief:

TABLE 2

(a) DUST ANALYSES - YUKON MINE - CROWN COAL CO.

Cam No.	Location	As Received - Percent Kind	Comb.	Ash	Moist.	Thru 20 Mesh Per Cent Grams	through 48	100	200	Oz. of Dust per ft. of Entry	Remarks
676	1 main between 11 & 12 rt.	Fl.	78.3	19.8	1.9	676.9	59.8	39.3	25.2)		6 in. Strip
									)	30.28	
659	do	R&R	74.8	23.0	2.2	141.0	57.4	35.0	18.1)		2 ft. strip
692	1 main at mouth 9 rt.	R&R	54.4	42.3	3.3	201	59.8	39.9	25.7)		2 ft. strip
									)	68.17	
701	do	Fl.	48.8	46.2	5.0	916	37.9	17.9	8.4)		6 in. strip
683	12 room 8 L-2 sec.	Fl.	75.6	21.6	2.8	356	46.4	24.7	13.2)		6 in. strip
									)	25.78	
697	do	R&R	51.5	42.2	6.3	37		No test	)		2 ft. strip
740	10 L 2nd main	Fl.	74.2	22.0	3.8	433	44.9	25.7	14.0)	31.68	6 in. strip
									)		
675	do	R&R	54.4	41.6	4.0	63		No test	)		2 ft. strip

(a) Samples collected by R. D. Currie and W. D. Walker.
Analyzed by H. M. Cooper.

It will be seen from this table that the dust is fine, that there is a lot of it, and that it is explosive.

Technical Paper 464, "Coal Dust Explosibility Factors Indicated by Experimental Mine Investigations 1911 to 1929", states "Experience has shown that every bituminous coal mine has enough coal dust present in its workings and entries to propagate an explosion unless the preventive measures described hereinafter are carefully followed." "In tests in the Experimental mine as little as 0.08 ounce of pulverized coal dust per cubic foot or 4.8 ounces per lineal foot of entry has propagated a strong explosion when distributed on cross and side shelves. Such an amount of coal dust when distributed around the perimeter of the entry is barely discernible to the eye."

The amount of coal dust required per cubic foot of entry, 0.08 ounce, is about that amount of dust that can be placed on a silver quarter dollar.

Mine Conditions Prior to Explosion:

The explosion occurred at about 2:06 a.m. while the night shift was at work. Conditions in the mine were normal. The fan was in operation and the greater part of the men in the mine were finishing up their work preparatory to going home.

The day foreman in 9 Right 1 main is quoted as saying that they were preparing to "make a fall" in No. 17 pillar 9 Right 1 main. From all indications this fall occurred immediately prior to the explosion. A six-ton closed type (unapproved) cable reel locomotive had just pulled a loaded and a partly loaded car out of 17 pillar,

presumably to prevent their being caught under the fall. This locomotive had "cut off" from the cars and had proceeded outby to about 15 room. The locomotive was under power at the time of the explosion. The controller was "on", the brake was "off" and the operating switch was set for the cable.

The Explosion and Recovery Work:

From the evidence at hand it is probable the heavy fall in 17 pillar raised a cloud of fine coal dust, perhaps also liberated some explosive gas, and that this cloud of dust (and gas) was ignited by arc from the cable reel locomotive. The locomotive cable is equipped with a "nipping" hook on the positive lead. This hook consists of a piece of copper trolley wire about 18 inches long which is used instead of the trolley pole when tramming the locomotive from one room to another on the butt entries. The evidence clearly showed that this locomotive was in operation by this method at the time of the explosion.

The explosion developed little violence on account of the wide open territory at the point of origin and the low velocity air current ventilating this section. Evidence of directed forces was lacking for the most part, although evidence of pressure was found at all ventilating doors surrounding the affected area.

There were twelve men in the affected area, including the night foreman, and all of them were killed.

A fire-boss had just completed his examination of the workings to the left of 2nd main adjoining the area where the explosion occurred and he felt the vibration of the explosion on his ear-drums. A few

minutes later he encountered smoke, and fearing a mine fire, he completed his inspection before coming out of the mine.

A machine man coming out of 2nd main after finishing his shift had reached the junction of 5 Right 1 main when the door flew open behind him. He is reported to have closed the door and continued to the outside, a distance of over 1000 feet, bringing the first report of the explosion.

Mine officials and state mine inspectors were notified and recovery operations were gotten under way promptly.

The fan was not interrupted in its operation although a sharp "bump" was recorded on the pressure gauge chart.

Ventilation of the affected area was re-established by a group of about 20 men, consisting of mine officials and state mine inspectors, a safety engineer of an adjoining mine and Yukon mine employees.

Without the aid of protective apparatus the affected area was recovered by this group and the twelve bodies located and brought to the outside by 3:00 p.m. of the same day.

A number of experienced rescue crews, with equipment, were being held in readiness if needed by companies in the district.

Previous Explosion - 1922:

A gas explosion occurred in this mine in 1922, shortly after the mine was opened and before the slope was sunk. This explosion is reported to have occurred when a stable man took a flame safety lamp apart to light it with a match after starting up a booster fan.

Coroner's Verdict:

The coroner's jury concluded that "the following men -

J. H. Livingston	Night Foreman
E. N. Casteel	Motorman
Chas. Jacobs	Brakeman
Sisco Fransco	Trackman
Henry Willis	Loader
Wm. Thompson	do
L. H. Harvey	do
Andy Smith	do
Frank Maricus	do
Adam Cult	do
Ed. Groves	do
Hillard Nelson	do

lost their lives when an explosion occurred in the Yukon mine of the Crown Coal Company, Arnettsville, W. Va., on March 26, 1930. The origin of the explosion was undetermined."

Recommendations:

The following recommendations are made in the interest of greater safety and with a view to preventing a recurrence of a disaster such as this in the Yukon mine. It is felt that these recommendations can be carried out without economic loss and they will, if carried out, make this mine a safer place in which to work.

It is recommended that:

1. More positive control be obtained over the ventilation, which is apparently adequate in volume, by efficient splitting, coursing and regulating of the available air supplied by the fan.

(a) Ventilating doors be replaced by overcasts and stoppings wherever possible. Where doors are used they be built in pairs to form an air lock.

2. The electrical equipment used in this mine be of a type approved as permissible for use in gassy mines and maintained in such permissible condition.

(a) Where open or non-permissible equipment be used it should be confined to pure intake air.

3. No power lines, trolley lines or armored cables be used or carried in return air, such as in rooms, pillars and return air courses, except machine cables equipped with approved junction boxes.

4. Mining machine cables now in use be provided with junction boxes for attaching the cables to the power lines, and the use of the "nipping hook" be prohibited.

5. Water lines and an adequate water supply be provided in every working place for use on mining machine cutting bars while undercutting the coal, for wetting down working places before shooting and loading is done, and for wetting down loaded cars.

6. To prevent the propagation of mine explosions rock-dusting be done in every part of the mine, whether in dry or damp condition, and that the rock-dust be applied in sufficient quantities that by systematic sampling the non-combustible content of the dust may be maintained at not less than 65 per cent and the rock-dusting be maintained to within 40 feet of the working faces.

7. All shooting be done only with permissible explosive, in permissible quantities, properly tamped with clay, and fired with permissible type single shot blasting units by qualified shot firers.

8. Proper clearance and shelter holes be maintained along all entries where hauling is done.

9. Consideration be given to providing a safe means of ingress and egress to the mine by providing a suitable stairway with safe hand rails and adequate illumination in the manway slope.

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 308 Laboratory No. 52194

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Mongali Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine

Method of sampling 2 qt. bottle Date sampled 5/28/30 Hour 9:10 am

Velocity 156 Area 40 sq. ft. Quantity

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet 59 Dry 59.5 Humidity %

Collector K.L. Marshall Mailed - Received 5/29/30

Laboratory No.	52194 308		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.11		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.56		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.43				
Nitrogen (N_2)	78.90				
Total					

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890

GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 307 Laboratory No. 52195

Sample of Mine air

Mine Yukon Operator Crown Coal

State W. Va. County Mongali Township

Town (distance and direction from, and railroad)

Name of coal bed Sec. , T. , R.

Location in mine Last place - 7 left stumps

Method of sampling vac. bot. Date sampled 3/28/30 Hour 9.50 am

Velocity Area Quantity

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet 62 Dry 53 Humidity %

Collector K. L. Marshall Mailed - Received 3/29/30

Laboratory No.	52195 307	Ethane (C_2H_6)	
Carbon dioxide (CO_2)	.16	Hydrogen sulphide (H_2S)	
Oxygen (O_2)	20.25	Unsaturated hydrocarbons (C_2H_4, etc.).	
Hydrogen (H_2)			
Carbon monoxide (CO)		Sulphur dioxide (SO_2)	
Methane (CH_4)	.13		
Nitrogen (N_2)	79.46		
Total			

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890

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DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 309 Laboratory No. 52196

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monongali Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine 9 L - 2nd section - part return from pillar in exp. section.

Method of sampling vac. bottle Date sampled 3/28 Hour 9:25 a.

Velocity - Area - Quantity -

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector R.D. Currie Mailed - Received 3/20/30

Laboratory No.	52196 309	Ethane (C_2H_6)	
Carbon dioxide (CO_2)	.11	Hydrogen sulphide (H_2S)	
Oxygen (O_2)	20.66	Unsaturated hydrocarbons (C_2H_4, etc.).	
Hydrogen (H_2)			
Carbon monoxide (CO)		Sulphur dioxide (SO_2)	
Methane (CH_4)	.38		
Nitrogen (N_2)	78.85		
Total			

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890

GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 310 Laboratory No. 52197

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine 15 room - 8 rt. at fall

Method of sampling vac. bottle Date sampled 3/28/30 Hour 10:35 am

Velocity - Area - Quantity -

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector R. D. Currie Mailed - Received 3/29/30

Laboratory No.	52197 310		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.14		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.46		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.36				
Nitrogen (N_2)	79.04				
Total					

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 310 Laboratory No. 52197

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine 15 room - 8 rt. at fall

Method of sampling vac. bottle Date sampled 3/28/30 Hour 10:35 am

Velocity - Area - Quantity -

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector R. D. Currie Mailed - Received 3/29/30

Laboratory No.	52197 310	Ethane (C_2H_6)	
Carbon dioxide (CO_2)	.14	Hydrogen sulphide (H_2S)	
Oxygen (O_2)	20.46	Unsaturated hydrocarbons (C_2H_4, etc.).	
Hydrogen (H_2)			
Carbon monoxide (CO)		Sulphur dioxide (SO_2)	
Methane (CH_4)	.36		
Nitrogen (N_2)	79.04		
Total			

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 311 Laboratory No. 52198

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine 10 room - 8 right - 1 main at gas well

Method of sampling - Date sampled 3/28/30 Hour 10:35

Velocity Area Quantity

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet 60 Dry 62 Humidity %

Collector K.L. Marshall Mailed - Received 3/29/30

Laboratory No.	52198 311		Ethane (C_2H_6)	
Carbon dioxide (CO_2)	.08		Hydrogen sulphide (H_2S)	
Oxygen (O_2)	20.65		Unsaturated hydrocarbons (C_2H_4, etc.).	
Hydrogen (H_2)				
Carbon monoxide (CO)			Sulphur dioxide (SO_2)	
Methane (CH_4)	.09			
Nitrogen (N_2)	79.18			
Total				

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 312 Laboratory No. 52199

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monong. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine 2nd section return - outby 9 right

Method of sampling - Date sampled 3/28/30 Hour 3:05 p.m.

Velocity 324 Area 60 sq. ft. Quantity

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet 55 Dry 59 Humidity - %

Collector Currie Mailed - Received 3/29/30

Laboratory No.	52199 312		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.09		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.69		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.27				
Nitrogen (N_2)	79.95				
Total					

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

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DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 313 Laboratory No. 52200

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monongalia Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickley Sec. , T. , R.

Location in mine At fan - full return from mine

Method of sampling vac. Date sampled 3/28/30 Hour 4:35 pm

Velocity 650 Area 100 Quantity 65000

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector R.D.Currie K. L. Marshall Mailed - Received 3/29/30

Laboratory No.	52200 313		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.10		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.65		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.22				
Nitrogen (N_2)	79.03				
Total					

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 514 Laboratory No. 52201

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monongahela Township

Town (distance and direction from, and railroad)

Name of coal bed Sewickley Sec. , T. , R.

Location in mine At fan full return from mine

Method of sampling Vac. Date sampled 3/28/30 Hour 4:35

Velocity 650 Area 100 Quantity 65000

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector R.D.Currie K. L. Marshall Mailed - Received 3/29/30

Laboratory No.	52201 314	Ethane (C_2H_6)	
Carbon dioxide (CO_2)	.09	Hydrogen sulphide (H_2S)	
Oxygen (O_2)	20.64	Unsaturated hydrocarbons (C_2H_4, etc.).	
Hydrogen (H_2)			
Carbon monoxide (CO)		Sulphur dioxide (SO_2)	
Methane (CH_4)	.25		
Nitrogen (N_2)	79.02		
Total			

Remarks:

Date 4/1/30 (Signed) W. P. Yant, Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 303 Laboratory No. 52227

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickly Sec. , T. , R.

Location in mine Full Half return at foot of fan shaft

Method of sampling vac. bottle Date sampled 4-4-30 Hour 9:20 a.m.

Velocity 1090 Area 60 Quantity 65,400

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet 55 Dry 55 Humidity %

Collector Currie & Walker Mailed Received 4-4-30

Laboratory No.	52227 303		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.11		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.55		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.23				
Nitrogen (N_2)	79.11				
Total					

Remarks:

Date 4-10-30 (Signed) W. P. Yant
Chemist.

Form 213 11—8390 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 304 Laboratory No. 52228

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickly Sec. , T. , R.

Location in mine Full return from 2nd section in 2 R - 2 main above - line room

Method of sampling vac. bottle Date sampled 4-4-30 Hour 11:00 a.m.

Velocity 100 Area 60 Quantity 6,000

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector Currie & Walker Mailed Received 4-4-30

Laboratory No.	52228 304		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.10		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.73		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.53				
Nitrogen (N_2)	78.84				
Total					

Remarks:

Date 4-10-30 (Signed) W. P. Yant
Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 305 Laboratory No. 52229

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickly Sec. , T. , R.

Location in mine At overcast - return from 3rd split

Method of sampling vac. bottle Date sampled 4-4-30 Hour 10:30 a.m.

Velocity 335 Area 63 Quantity 21,105

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector Currie & Walker Mailed Received 4-4-30

Laboratory No.	52229 305		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	.12		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.47		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.26				
Nitrogen (N_2)	79.15				
Total					

Remarks:

Date 4-10-30 (Signed) W. P. Yant
Chemist.

Form 213 11—8890 GOVERNMENT PRINTING OFFICE

DEPARTMENT OF COMMERCE
BUREAU OF MINES

GAS ANALYSIS REPORT

Bottle No. 306 Laboratory No. 52230

Sample of Mine air

Mine Yukon Operator Crown Coal Co.

State W. Va. County Monon. Township

Town (distance and direction from, and railroad) Arnettsville

Name of coal bed Sewickly Sec. , T. , R.

Location in mine 10 break thru - opp. 15 room 2 left off 1 main

Method of sampling vac. bottle Date sampled 4-4-30 Hour 9:00 am.

Velocity 113 Area 38 Quantity 4294

Barometer: Inside Outside

Corrected to sea level: Inside Outside

Bulbs: Wet Dry Humidity %

Collector Currie & Walker Mailed Received 4-4-30

Laboratory No.	52230		Ethane (C_2H_6)		
Carbon dioxide (CO_2)	306 .14		Hydrogen sulphide (H_2S)		
Oxygen (O_2)	20.57		Unsaturated hydrocarbons (C_2H_4, etc.).		
Hydrogen (H_2)					
Carbon monoxide (CO)			Sulphur dioxide (SO_2)		
Methane (CH_4)	.24				
Nitrogen (N_2)	79.05				
Total					

Remarks:

Date 4-10-30 (Signed) W. P. Yant
Chemist.

Form 213 11—8890
GOVERNMENT PRINTING OFFICE

Form 6—137

U. S. BUREAU OF MINES

E—DESCRIPTION OF MINE

(1) State West Virginia (2) County Monongalia (3) Town Arnettsville (Post office.)

(4) Mine sample of Dust (Material—for coal give classification.) (5) Coal field _____ (6) District Morgantown - Fairmont

(7) Mine Yukon (a. Name.) Slope - shaft (b. Kind of opening—if shaft give depth.) _____ (c. Height of opening above sea level.)

_____ (d. Distance and direction from town.) _____ (e. Sec., T., and R., if necessary.) Monongahela - Arnettsville (f. Railroad connections.)

_____ (g. Shipping point.) _____ (h. State if wagon mine or prospect and give distance from shipping point.)

(8) Coal bed Sewickly (a. Name.) Monongahela Series (b. Geologic system.)

_____ (c. Formation.) Practically flat (d. Dip, degrees.) _____ (e. Strike, direction.)

(9) Mining system Room & pillar (Long wall, room and pillar, panels, etc.) (10) Undercutting Machine (Hand or machine.)

(11) Explosives Hercoal "C" (a. Used for coal.) _____ (b. Used for roof or floor.)

(12) Operator Crown Coal Co. (Name and address.)

(13) Sales agent Imperial Coal Co. Johnstown, Pa. (Name and address.)

(14) Output per day 1200-1500 T (Average—gross or net tons.) (15) Maximum day's output 1900 (During past year.) (16) Last year's output 410,000 (Gross or net tons.)

(17) Output from advance workings, per cent _____ (At present.) (18) Lifetime of mine 50 (Years—estimated.)

(19) Run-of-mine, per cent _____ (Of output shipped.) (20) Is coal screened? Yes (21) Type of screens Rec. shaker (CL Miller)

(22) Type of washer _____ (23) Per cent of coal washed _____

(24) Maximum size washed _____ (25) Sizes produced _____ (Washed coal.)

(26) Sizes produced R.M. lump, nut sl. (Of coal not washed.) (27) Is coal picked? Yes - tipple (State whether on car or belt.)

(28) Per cent of coal coked _____ (At mine.) (29) Sizes coked _____ (Screenings, crushed, washed, etc.)

(30) Type and number of ovens _____ (31) Remarks _____ (For any additional information indicate after subject by mark X if additional information is given here.)

(32) Can Nos. 659, 676, 692, 701, 697, 683, 675, 740 (Give Nos. of all samples forwarded.)

(33) Laboratory Nos. A 60550 to 557 incl. (Laboratory to fill in immediately below corresponding can number.)

(34) Mine sampled at 4 (Number.) points, by R.D. Currie & D.W. Walker (Collector.) on Pgh., Pa. (Office.) 4/ 1 (Date.), 19 4/ 30

Above information copied from Card A by SaKash on April 9, 19 30

6—6372

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES

DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60550

Sample of Rib & Roof dust (through 20-mesh screen). Can No. 659

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine Main haulage road, between 11 & 12 rt. 12' x 5-1/2' timbered

Method of sampling 2f Strip Gross weight, lbs. _____ Net weight, gms. 141.

Date of sampling 4/2/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

		Air-dry Loss	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis	Moisture			2.2		
	Volatile matter ~~xxxxxx~~ Comb			74.8	76.5	(a)
	Fixed carbon					
	Ash			23.0	23.5	
				100.0	100.0	
Ultimate Analysis				Grams	Per Cent	
	Hydrogen			on 20 mesh		
	Carbon			40.0	26.4	
	Nitrogen			thru 20 mesh		
	Oxygen			101.0	71.6	
	Sulphur			total wt. of sample		
	Ash			141.0		
Calorific value determined	No. R.D.					
	Calories					
	British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	57.4
through 100 mesh	33.0
through 200 mesh	18.1

Area from which sample was taken (sq. ft.) _____

Date, April 21, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

11—9383

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES
DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60551

Sample of Floor dust (through 20-mesh screen). Can No. 676

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 1 Main between 11 & 12 rt. Dry and dusty

Method of sampling 6" strip Gross weight, lbs. _____ Net weight, gms. 763.

Date of sampling 4/2/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

		Air-dry Loss 1.3	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis	Moisture		.6	1.9		
	Volatile matter Comb		79.3	78.3	79.8	(a)
	Fixed carbon					
	Ash		20.1	19.8	20.2	
			100.0	100.0	100.0	
				Grams	Per cent	
Ultimate Analysis	Hydrogen			on 20 mesh		
	Carbon			86.1	11.3	
	Nitrogen			thru 20 mesh		
	Oxygen			676.9	88.7	
	Sulphur			total wt. of sample		
	Ash			763.0		
No Rock dust						
Calorific value determined	Calories					
	British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	59.8
through 100 mesh	39.3
through 200 mesh	25.2

Area from which sample was taken (sq. ft.) _____

Date, April 15, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

11—9383

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES
DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60552

Sample of Road & Rib dust (through 20-mesh screen). Can No. 692

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 1 Main at mouth of 9 rt. Edge of expl. zone

Method of sampling 2 ft. strip Gross weight, lbs. _____ Net weight, gms. 201.

Date of sampling 4/2/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

		Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
	Air-dry Loss 1.5				
Proximate Analysis	Moisture	1.9	3.3		
	Volatile matter Comb	55.2	54.4	56.2	(a)
	Fixed carbon				
	Ash	43.0	42.3	43.8	
		100.0	100.0	100.0	
			Grams	Per Cent	
Ultimate Analysis	Hydrogen				
	Carbon on 20 mesh		42.6	21.2	
	Nitrogen thru 20 mesh		156.4	78.8	
	Oxygen total wt. of sample		201.0		
	Sulphur				
	Ash				

slight traces of coke on ribs - indication of old rock dusting

Calorific value determined	Calories				
	British thermal units				

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	59.8
through 100 mesh	39.9
through 200 mesh	25.7

Area from which sample was taken (sq. ft.) _____

Date, April 15, 1930 (Signed) H. M. Cooper, *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

11—9383

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES

DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60553

Sample of Floor dust (through 20-mesh screen). Can No. 701

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine1 Main at mouth 9 rt. Edge of exp. zone

Method of sampling6" strip Gross weight, lbs. _____ Net weight, gms. 916.

Date of sampling 4/2/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Asc Collector R.D. Currie

		Air-dry Loss 4.0	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis	Moisture		1.0	5.0		
	Volatile matter Comb		50.8	48.8	51.3	(a)
	Fixed carbon					
	Ash		48.2	46.2	48.7	
			100.0	100.0	100.0	
Ultimate Analysis	Hydrogen			Grams	Per cent	
	Carbon on 20 mesh			274.1	29.9	
	Nitrogen thru 20 mesh			641.9	70.1	
	Oxygen total wt. of sample			916.0		
	Sulphur					
	Ash					
Calorific value determined	Calories					
	British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	37.9
through 100 mesh	17.9
through 200 mesh	8.4

Area from which sample was taken (sq. ft.) _____

Date, April 15, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

11—9383

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES

DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60654

Sample of R A R dust (through 20-mesh screen). Can No. 697

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 12 room - 8 L- 2nd Section at piller line

Method of sampling ft. strip Gross weight, lbs. _____ Net weight, gms. 37.

Date of sampling 4/3/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

		Air-dry Loss 5.4	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis	Moisture		.9	6.3		
	Volatile matter Comb		54.5	51.5	55.0	(a)
	Fixed carbon					
	Ash		44.6	42.2	45.0	
			100.0	100.0	100.0	
				Grams	Per Cent	
Ultimate Analysis	Hydrogen			on 20 mesh		
	Carbon			6.5	17.0	
	Nitrogen			through 20 mesh 30.7	83.0	
	Oxygen			total wt. of sample 37.0		
	Sulphur					
	Ash					
				at edge of Explosion zone		
Calorific value determined	Calories					
	British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh No size. Insufficient sample	100
through 48 mesh	
through 100 mesh	
through 200 mesh	

Area from which sample was taken (sq. ft.) _____

Date, April 21, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

11—9382

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES

DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60555

Sample of Floor dust (through 20-mesh screen). Can No. 683

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 12 Room - 8 L 2nd sections - at pillar line

Method of sampling 6" strip Gross weight, lbs. _____ Net weight, gms. 356.

Date of sampling 4/3/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

	Air-dry Loss 2.0	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis — Moisture		.8	2.3		
Volatile matter		77.1	75.6	77.8	(a)
Fixed carbon					
Ash		22.1	21.6	22.2	
		100.0	100.0	100.0	
			Grams	Per Cent	
Ultimate Analysis — Hydrogen					
Carbon on 20 mesh			134.7	37.9	
Nitrogen thru 20 mesh			221.3	62.2	
Oxygen total wt. of sample			356.0		
Sulphur					
Ash					
Calorific value determined — At edge of exp. zone					
Calories					
British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	46.4
through 100 mesh	24.7
through 200 mesh	15.2

Area from which sample was taken (sq. ft.) _____

Date, April 15, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

11—9383

Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES
DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60556

Sample of R & R dust (through 20-mesh screen). Can No. 675

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 10 left - 2nd main inby line rooms

Method of sampling 2 ft. strip Gross weight, lbs. _____ Net weight, gms. 63.

Date of sampling 4/3/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Ace Collector R.D. Currie

		Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
	Air-dry Loss 3.2				
Proximate Analysis	Moisture	.8	4.0		
	Volatile matter Comb	56.2	54.4	56.6	(a)
	Fixed carbon				
	Ash	43.0	41.6	43.4	
		100.0	100.0	100.0	
			Grams	Per Cent	
Ultimate Analysis	Hydrogen on 20 mesh		4.1	6.5	
	Carbon thru 20 mesh		58.9	93.5	
	Nitrogen total wt. of sample		63.0		
	Oxygen				
	Sulphur				
	Ash				
	Edge of exp. zone				
Calorific value determined	Calories				
	British thermal units				

Screen test, through 20 mesh No size. Insufficient sample — *Cumulative per cent.* 100

through 48 mesh _____

through 100 mesh _____

through 200 mesh _____

Area from which sample was taken (sq. ft.) _____

Date, April 15, 1930 (Signed) H. M. Cooper, *Chemist.*

a This figure is the ratio of volatile combustible to total combustible.

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Form 261

DEPARTMENT OF COMMERCE
BUREAU OF MINES

DUST-ANALYSIS REPORT

Test No. _____ Lab. No. A 60557

Sample of Floor dust (through 20-mesh screen). Can No. 740

Operator Crown Coal Co. Mine Yukon

State W. Va. County Monongalia Bed Sewickley

Town Arnettsville

Location in mine 10 left, 2nd main - inby line room

Method of sampling 6" strip Gross weight, lbs. _____ Net weight, gms. 433.

Date of sampling 4/3/30 Date of Lab. sampling 4/9/30 Date of analysis _____

For B. of M. section Mine Acc Collector R.D. Currie

	Air-dry Loss 3.0	Coal (Air dried)	Coal (As received)	Coal (Moisture free)	Coal (Moisture and ash free)
Proximate Analysis — Moisture		.9	3.8		
Volatile matter Comb		76.4	74.2	77.1	(a)
Fixed carbon					
Ash		22.7	22.0	22.9	
		100.0	100.0	100.0	
			Grams	Per Cent	
Ultimate Analysis — Hydrogen					
Carbon 20 mesh			147.4	34.0	
Nitrogen thru 20 mesh			285.6	66.0	
Oxygen total wt. of sample			433.0		
Sulphur					
Ash					
Edge of exp. zone					
Calorific value determined — Calories					
British thermal units					

	Cumulative per cent.
Screen test, through 20 mesh	100
through 48 mesh	44.9
through 100 mesh	25.7
through 200 mesh	14.0

Area from which sample was taken (sq. ft.) _____

Date, April 21, 1930 (Signed) H. M. Cooper, *Chemist.*

[a] This figure is the ratio of volatile combustible to total combustible.

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