Major accidents in the Indian Coal Mines (1952-2005)

S.N.	Dates of Accident	Name of Mines	Fatalities	Cause
1	12/07/1952	Dhemomain	12	Roof fall
2	05/08/1953	Majri	11	Inundation
3	14/03/1954	Damra	10	Explosion of fire damp.
4	10/12/1954	Newton Chikli	63	Inundation
5	05/02/1955	Amlabad	52	Explosion of fire damp.
6	26/09/1956	Burra Dhemo	28	Inundation
7	19/02/1958	Chinakuri	175	Explosion of fire damp.
8	20/02/1958	Central Bhowra	23	Inundation
9	05/01/1960	Damua	16	Inundation
10	28/05/1965	Dhori	268	Coal dust explosion
11	11/04/1968	West Chirmiri	14	Premature collapse of workings
12	18/03/1973	Jitpur	48	Explosion of fire damp.
13	08/08/1975	Kessurgarh	11	Roof fall
14	18/11/1975	Silewara	10	Inundation
15	27/12/1975	Chasnala	375	Inundation
16	16/09/1976	Central Saunda	10	Inundation
17	04/10/1976	Sudamdih	43	Explosion of fire damp.
18	22/01/1979	Baragolai	16	Ignition of fire damp
19	24/08/1981	Jagannath	10	Water gas explosion
20	16/07/1982	Topa	16	Roof fall
21	14/09/1983	Hurriladih	19	Inundation
22	13/11/1989	Mahabir	6	Inundation
23	25/01/1994	New Kenda	55	Fire/suffocation by gases
24	26/09/1995	Gaslitand	64	Inundation
25	06/07/1999	Prascole	6	Fall of roof/collapse of workings
26	24/06/2000	Kawadi	10	Failure of OC bench
27	02/02/2001	Bagdigi	29	Inundation
28	05/03/2001	Durgapur Rayatwari	6	Collapse of partings/workings
29	16/06/2003	Godavari Khani-7LEP	17	Inundation
30	16/10/2003	GDK-8A	10	Roof fall
31	15/06/2005	Central Saunda	14	Inundation

Surda Copper Mine | Blasting Fumes Accident | 5 Fatal | 1984

Date of the Accident	:	04/04/1984
Owner	:	Hindustan Copper Ltd.
Number of persons killed	:	5
Place	:	Singhbhum Copper Belt, Jharkhand

This accident occurred in No.10 level stope which was worked by the “post-pillar method”. The method of stoping comprised horizontal slicing over a strike distance of about 80 m upto the full width of the ore-body leaving 4 m square vertical posts in-situ at intervals of 13 m along the strike direction and 9 m across the ore-body. The void thereafter was hydraulically stowed solidly with mill tailings. Slicing was started from the lower level after leaving a 10 m thick sill pillar and it continued upto the upper level. The rock was hard and blasting invariably produced boulders which needed secondary blasting. ANFO was used for “plaster-shooting” to break the boulders. A cartridge of special gelatine was used as booster for ANFO.

On 4.4.1984 by about 9 p.m., 80 boulders had been charged for plaster shooting in the 10 level stope. All the 80 shots were fired simultaneously electrically from No.9 level which, was the return airway for the 10 level stope. The mate, the blaster, his helper and four drillers of No.9 level stope, remained ion No.9 level. After blasting at 9.30 p.m., the mate, the blaster, his helper and two drillers, tried to reach No.9 level sub-incline platform but a ventilation door on the way was found jammed due to the shock wave of blasting. In the meantime, electric power failed resulting in stoppage of the fan. These people retraced their steps passing through an atmosphere laden with blasting fumes. They then contacted No.10 level sub-incline on telephone. The mate of No.10 level development district came along with a few more persons and opened the offending ventilation door. Then the seven persons inbye of the door came to No.9 level sub- incline at 10.05 p.m. Three of them (the blaster, his helper and one driller) were feeling uneasy. They were sent to the hospital at Mosaboni at 11 p.m. The mate did not feel much discomfort and went to his residence. But after some time he felt difficulty in breathing and was brought to the hospital at about mid-night. All these four patients initially had severe headache, uneasiness, irritation in the chest and slight breathing difficulty. In 2 hours their condition deteriorated and all of them died between 2.30 and 3.30 a.m. on 5.4.1984, that is, within 6 hours of their being affected by blasting fumes. Another driller had gone to bed after taking his dinner. After a few hours he also complained of difficulty in breathing. He was taken to the hospital at 5. I 0 a.m. but expired within 10 minutes.

Investigations under simulated conditions indicated that immediately after blasting, the concentration of nitrous oxides in the atmosphere near the, offending door exceeded 100 p.p.m. It was the exposure to such high concentration of oxides of nitrogen which led to the death of five persons.

Bagdigi Colliery | Gas Explosion | 19 Fetal | 1935

Date of the Accident	:	29/06/1935
Number of persons killed	:	19
Owner	:	Anderson Wright & Co.
Place	:	Jharia Coalfield

A total of 108 persons had entered the mine during the afternoon shift. At about 7 p.m. Chitoo Mia, one of the overmen, suspected that things were not as they should be and he ordered withdrawal of the men. Thereafter he proceeded to another area to withdraw the workmen employed there. By 8.30 p.m., 103 persons, including the other two overmen, had come out of the mine. There is no clear evidence as to what Chitoo Mia had suspected as he, along with the 4 remaining workers, died in the underground working. At about 8.50 p.m. when the Assistant Manager and a day-shift overman had entered the incline-cutting to go down the mine, a violent explosion took place and a great volume of flame, dust and pieces of coal were projected out of the inclines with great force. A total of 21 persons on the surface, including the Assistant Manager and the Overman, some men who were following them and some others who were sitting outside the inclines, were burnt or injured. 14 of them died later.

No inflammable gas had ever been detected in the workings of the mine. All the workmen used naked lights. On the day of the accident it had been raining heavily and a retaining wall protecting the mine from a large tank and a 'nallah' had collapsed shortly before the explosion. A large quantity of water suddenly entered into the upper seams which were on fire. The water generated gases and produced a reversal of the air in the mine which gradually filled the workings with an inflammable mixture of gases. The mixture was ignited either by the fire in the upper seams or the naked lights of the five persons who were entombed in the mine. The explosion was predominantly of inflammable gases but might have been augmented by coal dust.

The Court of Inquiry made the following recommendations:-

- The Government should appoint, as soon as possible, a representative committee to enquire fully into the dangers arising from underground fires in coal mines and to report on the steps that should be taken to combat these dangers.
- Regulations should be framed requiring:-
  - Managements of all coal mines to take adequate steps to prevent air passing through a goaf or area in which there is a fire.
  - The provision of a mechanical ventilator in mines in which there is a fire.
  - The sending of a notice to the Inspector of Mines and the District Magistrate when an influx of noxious gases occurs in a mine.
  - The use of safety lamps in districts of a mine in which there is a fire.
  - The precautions to be taken with respect to the danger of coal dust in mines in which there is an underground fire.
  - Restrictions on working of a seam below an area in an upper seam which is on fire so that the strata between the seams shall be maintained unbroken.
  - The existing regulations should be amended to require inspection of fire stoppings and parts of the mine in which there is a fire, to be made with safety lamps and means of detecting CO.

As a result of this accident, emergency safety regulations were framed which covered almost all the above recommendations.

Newton Chikli Colliery | Innundation | 63 Fetal | 1954

Date of the Accident	:	10/12/1954
Number of persons killed	:	63
Owner	:	Newton Chickly Collieries Ltd.
Place	:	Dist. Chhindwara (M.P.)

Flooding of the mine was caused by inrush of water from old workings of the same mine. The parting between Top seam and Bottom seam was about 13 m and a fault of about the same throw had brought the two seams more or less in juxtaposition. Workings made in the Top seam were abandoned in 1933 and a huge quantity of water had accumulated in the abandoned workings between 1933 and 1954. The new workings in Bottom seam got connected with the old water-logged workings and water rushed in to flood the new workings. The old workings had not been shown correctly on the plan. The management was not aware that the new workings had approached so close to the abandoned workings and therefore no exploratory advance boreholes were being drilled in the new headings. There were 112 persons inside the mine when it was inundated. 49 persons managed to escape through the incline; the remaining 63 persons were entrapped and drowned.

This was the most serious disaster that had occurred due to wrong survey and improper study of the plans. The Court inquiring into this disaster made the following recommendations which were later incorporated in the regulations:-

- The original plan of workings of an abandoned mine should be preserved in the office of the mine and a certified true copy submitted to the RIM [CMR-61 (2),61(1),61(3)(a)]
- When the workings of a mine are within 60 m of old workings in any horizon, the CIM should be informed and an agreed scheme of approach should be evolved [CMR-127(3)]. The owners of adjoining mines shall be bound to disclose the plans of abandoned workings within a distance of 60 m [CMR-59(4)(b)].
- All statutory plans shall be serially numbered and a record thereof maintained in a register. Entries in the register shall be signed and dated by the surveyor and countersigned and dated by the manager. All field books and other records relating to the preparation of plans shall be carefully preserved [CMR-63].
- The current working plans of every mine should show the position of old goaves, within the leasehold and within 60 m of the boundary of the leasehold as also all drifts, staple pits and exploratory headings in the same seam or different seams [CMR-59(b)]. The position of all boreholes should be shown [59(1)(a)].
- Reduced levels of floor in galleries and at faces of exploratory galleries, drifts & staple pits should be shown when mine is abandoned. Drifts in stone & galleries in coal at different levels should be clearly indicated by different colours & appropriate notings [CMR-59(3)].
- A detailed survey of all workings must be made in every district in which extraction or reduction of pillars is about to take place [CMR-100(1)].
- The throw of each fault (when proved) should be written [CMR- 59(b)(vi)]. Barriers of coal to be left for safety or support shall be clearly marked in green (CMR-58]. Underground working plan shall be kept up-to-date within 3 months (CMR-58(3)].
- A section through strata above working seam & one/more sections of seam being worked together with height of galleries at different places should be shown on plan [CMR-59(b)(v)].
- The surveyor should specify the original plan or document from which the copy or tracing has been made [CMR-64(3)].
- Records of personal visits to underground workings by the manager, asstt. Manager, surveyor and other supervisory staff should be maintained. [CMR-41 (1) (b), and others]
- Each colliery should have a qualified surveyor. Engagement of services of one surveyor by more than one colliery at same time should be subject to the approval of the CIM [CMR-35].

Amlabad Colliery | Fire Dump Explosion | 52 Fetal | 1955

Date of the Accident	:	05/02/1955
Number of persons killed	:	52
Owner	:	Bhowra-Kankanee Collieries Ltd.
Place	:	Jharia Coalfield

The colliery was started in the year 1917 by the Eastern Coal Co. Ltd. under the managing agency of Mackino Mackenzie & Co. The managing agents changed hands in the year 1951 when Macneill & Barry Ltd. became the new managing agents of Eastern Coal Co. The mine passed into the hands of Bhowra-Kankanee Collieries Ltd. with K.C. Thapar & Bros. Ltd. as managing agents in the month of January, 1955. Seam Nos. XVIII, XVII and XVI had been worked in the past but coal raising from XVII and XVI seams was stopped in 1951 and since that time only No. XVIII seam was being worked. This was known to be gassy. When the new management took over the colliery, working was started by removing two stoppings in a rise area which had been abandoned. Miners were employed in this area whenever there was scarcity of faces because of larger attendance. 5th February 1955 was the date of visit of States Reorganization Commission, commonly known as the Boundary Commission, and many workers, including some essential hands like pump khalasis, haulage khalasis and trammers, did not report for work as they had gone to take part in a demonstration before the Boundary Commission. On the day of the accident, although attendance was very poor, miners were sent to work in the rise area which had not been worked except for driving two galleries till the end of December, 1954. It was a dangerous area in the sense that the mine was gassy and one gallery had been driven upto a fault whiles the other met "jhama". Owing to absence of an attendant at the door behind an endless haulage, the door had been constantly kept open, thus allowing short-circuiting of intake air & destroying ventilation. This resulted in accumulation of firedamp in rise area. The accumulated gas was ignited, but it had not been possible to find the source of ignition. It might have been ignited by sparks from a non-flameproof 60 HP haulage which should not have been there. There was a firedamp explosion & probably coal dust took part in explosion. Signs of coking were found at time of inspection of mine. Dead bodies were found covered with coal dust.

The responsibility of this explosion was placed on the management. The manager had himself noted in his diary, which he wrote after the explosion, that men should not have been sent to work in that area as it was not a safe area unless good and sufficient precautions had been taken. And, on 5th February, 1955, instead of taking precautions, there was utter neglect in seeing that ventilation was proper and adequate. The result was that the ventilation was deranged and gas accumulated in the rise area by reason of short-circuiting of the intake air through the door behind the endless haulage. Had proper precautions been taken, the accident could have been averted.

The Court of Inquiry made a number of important recommendations some of which are as follows:-

- People connected with mining operations should be made aware, by intensive and extensive methods of advertisements, pictures, lectures, etc. of the dangers to which they may be exposed by carelessness and how to prevent them. It may possibly be useful to form "Safety Committees" consisting of representatives of the officials and workmen in order to make mine workers aware of the dangers and their prevention.
- A labour representative should be permitted to go underground and inspect the places where miners work, in order to afford additional safeguards for their safety.
- The use of flameproof apparatus should be made compulsory in every part of a gassy mine.
- Use of electric safety lamps by all workmen should be made compulsory in preference to the flame type of lamps.
- In a gassy mine, the air current ventilating a goaved area and disused workings should not be allowed to ventilate the working places.
- Any change in the system of ventilation in a mine where safety lamps are required to be used should at once be notified to the Inspector of Mines.

- Appointment of Assistant Mangers in large mines should be made on a prescribed scale; their number depending upon the monthly output of the mine.
- A regulation should be added to the effect that no mine shall be worked unless daily personal supervision in respect of the working is exercised by the Manager, and during his absence, by a person authorized by him.
- The “adequacy of ventilation” should be defined in more precise terms.
- Provision should be made for the appointment of door attendants to attend to doors, the opening of which may lead to derangement of ventilation.
- Provision may be made in the regulations for appointment of a “Ventilation and Safety Engineer” in gassy mines.
- It appears that there is no co-ordination between the Mines Inspectorate and the Electrical Inspectorate. It is the Mines Inspectorate which ordinarily tests for inflammable gases in the mine. This information ought to be made available to the Electrical Inspector in order to take and adopt necessary safety precautions in the matter of electrical installations or, the Electrical Inspector of Mines may be brought under; the Chief Inspector of Mines, so that both sets of these officers may’ coordinate to ensure safety in mines.

Chinakuri Colliery | Fire Dump Explosion | 183 Fetal | 1958

Date of the Accident	:	19/02/1958
Number of persons killed	:	183
Owner	:	Bengal Coal Co.
Place	:	Raniganj Coalfield

The Chinakuri Colliery was a combined mine consisting of the workings of Nos. 1 and 2 pits colliery and of No.3 pit colliery working the Disergarh seam. The Disergarh seam was known to produce inflammable gas and its average make in the workings of Nos. 1 and 2 pits was 8.5 m3/min. The explosion took place in the workings of Nos. l and 2 pits on 19th February, 1958 at about 9.45 p.m. On the surface, first a loud hissing sound was heard, and then there was a loud report. A tongue of fire about 1m long was seen in the fan evasee. This flame was partly bluish and partly yellowish in colour and lasted only for a few seconds. Men underground in No.3 pit were withdrawn by 10.30 p.m. Cages in No.1 pit could not be wound as the lower cage got jammed. The shaft covers of No.2 pit (up-cast) which had been blown upwards were secured and the cages in this shaft were wound a number of times to ensure that the shaft was free from obstructions and that it was safe to send down a team.

The first rescue team was sent down at 11.50 p.m. and returned within 10 minutes as had been agreed upon. They brought with them one survivor. The same rescue team went down again at 12.15 a.m. The derangement of shaft signals made it necessary to arrange for the cages to be wound every 10 minutes. By about 4 a.m. there were altogether 27 teams of 5 men each available for rescue work. Altogether 20 men were rescued that night and out of them 4 died later.

With the return of the third rescue team to the surface there was a discussion and it was considered by one and all that the possibility of life underground under the conditions reported was nil. In view of the open flames seen underground by the last team and the inevitability of further explosions of methane which was building up in the galleries as a result of the derangement of the ventilation system with the destruction of doors and stoppings, it would be hazardous to risk any further rescue parties underground. Accordingly, at about 4.30 a.m. it was finally decided that no further rescue team should be sent underground. It was further decided to stop the fan and it was stopped at 4.50 a.m. Then light seals were built at the mouths of Nos.1 and 3 pits, the sand stowing pit and the sand stowing drift. The mouth of No.2 pit was left open. These seals were completed by 9.30 a.m. on 20th February. At about 11 a.m. traces of smoke were seen coming out of No.2 pit and an attempt was made to tighten up the seals at No.1 pit to prevent the ingress of air. But at 11.30 a.m., there occurred a rapid succession of two explosions which blew off the seal at the mouth of No.1 pit and the stopping at the mouth of the sand stowing drift. The explosions were followed by the emission of large quantities of black smoke from No.2 pit. No.1 pit still continued to downcast and it was apparent from the volume of smoke coming out of No.2 pit that there was a substantial fire in the underground workings, it was considered unsafe to engage persons for building up seals at the top of either of the shafts. It was then decided to put out the fire by flooding the mine with water and in the meantime to seal the mouth of No.1 pit by using a scraper conveyor to dump down the shaft bricks, clays, mattings, etc.

The first pontoon-mounted pump with a capacity of 4550 m3/hr started pumping water into the sand stowing drift at 12.30 p.m. on 20th February, 1958. On the same day at about 5 p.m. the conveyor had started delivering sand etc. into No.1 pit and the mouth of the sand stowing drift was re-sealed by 5.30 p.m. By 3 p.m. on 22nd February, the introduction of sand etc. into No.1 pit was completed. At 2.30 p.m. on the 24th February when it was found on a rough measurement of the water in No.2 pit that the water had risen above the necessary level, the pumping of water into the sand stowing drift was stopped.

Cause of the explosion

There was a large outburst of gas from the splinter seam immediately beneath the Disergarh seam. This splinter seam was known for its inherent gassy nature having confined gas under pressure. The intervening

strata had become so thin that it was no longer able to repress the upward progress of the gas and consequently the floor was lifted, liberating a large volume of gas which caused the explosion. This view is supported by the following facts:

- ✓ Bluish methane flame streaked with yellow in the fan evasee immediately after explosion.
- ✓ About 3 hours after the explosion, samples of gas taken on the surface showed 2.5% CH4 indicating that inside the shafts concentration of CH4 was much higher.
- ✓ Impossibility of such a build up of gas in mine from its natural make without its being detected.
- ✓ The large majority of the dead bodies was found at or near the working faces suggesting that they were overpowered by such an unexpected danger that they could not make the least attempt to save themselves.

As regards the source of ignition, the Court of Inquiry concluded that a flame shooting out from diesel loco inlet might have ignited the explosive mixture of methane and air. While on the exhaust, a flame-trap was provided, there was none on the inlet side. The absence of such flame traps on the locomotives renders them potential sources of ignition when they are, operated in an explosive atmosphere. The outburst of methane must have been accompanied by certain quantity of small coal from splinter seam & therefore coal dust must have taken part from an early stage and assumed somewhat important role as explosion reached the downcast area, that is, the region of fresh air.

The Court of Inquiry appointed to inquire into the causes of, and circumstances attending the explosion made the following recommendations:

- ❖ In all gassy mines a continuously automatic recording water gauge of approved type should be fitted to the main fan at the surface. Such a recording gauge, if there was one in this mine, would have shown at once that there was an outburst of gas, and removed doubts and arguments and saved much time in the inquiry. It will also show to the management whether fan is operating normally and whether there are any unusual conditions in mine.
- ❖ No apparatus should be accepted in India as certified flame-proof without report by the engineer or representative supplying the equipment that he has personally seen that it is properly assembled and in safe condition. It should be made illegal to attach the official flame-proof label to this equipment unless the whole equipment is rendered flame-proof with all flame-traps and similar devices affixed and in order.
- ❖ The matter of appointment of one or more mechanical engineers to the staff of the Mines Inspectorate is crucially urgent as mine mechanization is now proceeding apace.
- ❖ The Central Mining Research Station should be asked to undertake more extensive research work in suppression of explosions and other mining hazards.
- ❖ Rescue teams didn't take sufficient air samples from ug workings which they visited. There should be a rule compelling the taking of air samples by rescue teams. Sampling equipment should be devised so that it should form part and parcel of the rescue equipment.
- ❖ There should be one or two portable Haldane gas analysis apparatus, or the like, maintained in working order at every rescue station and one or two members of the rescue station staff should be trained in the correct operation of the apparatus.
- ❖ Enough teams were not sent underground so as to render simultaneous exploration of the western and the eastern districts possible and that the first two teams did not go at all to the eastern side and make an attempt to rescue survivors from that region. Although there is nothing in the Coal Mines Rescue Rules, 1939, it is a recognized practices that only one team at a time is sent underground as otherwise confusion may arise.
- ❖ In gassy mines, especially where the seam appears to have less than its normal thickness, 3 m deep boreholes shall be put down at intervals of 90 m to explore whether there is an approaching seam or whether there is excessive liberation of gas.
- ❖ Mine dust samples should be taken over a length of roadway not exceeding 100 m and the mine should be divided into convenient zones to be approved by RIM. The dust of each zone shall be tested at least once a month.

Dhori Colliery | Coal Dust Explosion | 268 Fetal | 1965

Date of the Accident	:	28/05/1965
Number of persons killed	:	268
Owner	:	Bokaro & Ramgarh Ltd.
Place	:	East Bokaro Coalfield

On the night between the 27th and 28th of May, 1965, at about 1 a.m. one of the biggest disasters in the history of coal mining took place at Dhori Colliery. It caused tremendous material damage and killed 268 persons, this being the highest number of deaths in an explosion in India. The Dhori Colliery has a number of seams, namely, Amlo, Upper Kargali, Lower Kargali, Bermo and the Karo group of seams including Phusro seam. At the time of the accident only the Bermo seam was being worked underground. Immediately south of the workings of the Bermo seam there was a big fault known as the Gobindapur-Pichri fault. This fault was represented by a well-defined crushed zone. The northern upthrown area was, however, relatively free from faulting, where active mining operations were carried out. The fault had brought the Upper Kargali seam of the southern downthrown block almost in juxtaposition with the Bermo seam of the northern area. Upper Kargali was known to be a gassy seam. Upto the time of the explosion, the mine was treated as non-gassy. Naked lights (hurricane lanterns) were used in the mine for the purpose of illumination. There was no mechanical ventilator, the air being circulated by natural ventilation only.

Two rival theories had been placed before the Court of Enquiry by the parties. The theory put forward by the Department of Mines purported that there was an accumulation of firedamp within explosive limits in 15 level south of BI.10A incline prior to the accident. It was ignited by the hurricane lantern of a person who entered this gallery. The reason why the person entered the gallery, which was not being worked at the time, could not be definitely fixed. As a result of this ignition, a firedamp explosion was caused, and as there was enough fuel in the form of coal dust in all parts of mine, a coal dust explosion was initiated by gas explosion which soon propagated to all the other parts of the mine. The contributory causes of the accident were (i) lack of ventilation, (ii) the use of naked lights in the mine, and (iii) presence of coal dust and the failure to treat it properly.

The management, however, repudiated above theory & held that explosion was the result of an act of sabotage. This idea probably had its origin in the 45-day strike which was called off only a week before the day of explosion. The management's theory was completely demolished during the cross-examination of the manager and other witnesses. Moreover, the seat of the explosion as suggested by the management did not fit in with the general direction of propagation of the explosion.

As a result of the findings, the Court of Enquiry made the following recommendations:

- Even in non-gassy mines, all workers below-ground should be provided with electric cap lamps.
- All the mining sirdars, shotfiring sirdars and overmen must be trained to detect the presence of methane in the mine atmosphere. Endorsement for gas-testing on the certificates of all the mining sirdars, shotfiring sirdars and overmen should be revalidated periodically.
- Some common precautions should be introduced in all the mines, gassy or non-gassy, especially in the working faces. Every mine must be required to test for gas in each working face and also in all places within a distance of say 100m, from the working face by means of a more accurate and more sensitive instrument than a flame safety lamp or by analysis of samples of air. This should be done by the manager or an under-manager.
- Even in non-gassy mines, steps should be taken to ensure better ventilation. Regular measurements of air should be taken in all mines.
- The distance to which a gallery can be driven "blind" must be enforced. Normally, it should be obligatory to make ventilation connections as soon as the gallery is driven a pillar-and-a-half length or 50 m from the last ventilation connection, whichever may be more.

West Chirimiri Colliery | Air Blast | 14 Fetal | 1968

Date of the Accident	:	11/04/1968
Owner	:	M/S Inder Singh & Sons Pvt. Ltd.
Number of persons killed	:	14
Place	:	Dist.-Surguja, Madhya Pradesh

The accident occurred in the Main Seam in the splitting district of 9 and 10 Inclines. This seam, 4 m thick and inclined at 1 in 45, had been developed along the floor with pillars 23 m x 23 m and galleries 3.6 m wide x 2.1 m high. The cover over the area varied from 50 m to 90 m and at the maximum depth, the cover comprised a 45 m thick dolerite sill and 45 m of sandstones. Permission had been granted for splitting of the pillars as final operation leaving 30% of coal in-situ in the form of stooks and restricting the height of extraction to 3.8 m. After 14 pillars had been split, an inspection revealed that the stooks being left were too small for their stability. The management was therefore directed to leave stooks of 6.75 m x 6.75 m.

Upto the time of the accident, out of 125 pillars in the panel, 70 pillars had been split covering an area of 213 m x 183 m. Systematic Timbering Rules had been framed and enforced in the panel. On 11.4.1968 work in the afternoon shift had started as usual at 3 p.m. and 64 persons were engaged in the splitting panel. After blasting operations were completed by about 5 p.m., the goaf started “talking” more prominently - the sound of strata movement in the goaf kept on increasing in intensity. There was also a small fall of roof in the goaf resulting in a mild air-blast and thereafter the workers started running outbye. It took some time for the supervisory staff to contact the manager who instructed them to withdraw all persons from the mine. At about 6 p.m. when some of the workers were going out through the haulage and travelling roadways, a scouring air-blast took place and these persons were caught in the air-blast. 8 of them died on the spot and 6 others died subsequently. 16 were seriously injured and 27 received minor injuries.

One of the factors that contributed to the high number of fatalities was fitting of heavy steel doors in two preparatory stoppings. These doors were unhinged and thrown over a distance of 80 to 90 m by the air-blast, hitting the fleeing workers on their way. The volume of air displaced was about 95000 m3 and this air passed through 3 openings which had a total area of cross-section of about 14 m2 only. Most of the blast passed through the two intake roadways.

Cause of the accident

The stooks left in the initial stages of depillaring were of much smaller dimensions than prescribed and these were gradually getting attenuated due to the pressure of the massive roof. When some of these stooks ultimately gave way, a general movement in the goaf started, finally resulting in the total collapse of the roof right upto the edges of the split pillars. The fall of roof did not occur all on a sudden but at the final stage a fairly large area had collapsed which pushed out a large volume of air from the goaf to the outbye workings. There were definite indications of roof movement in the goaf since one hour before the accident occurred. Although the supervisory staff did withdraw persons from the active workings, they did not know what further action was called for. Had they ensured complete withdrawal from the mine, the loss of life and physical injuries could have been avoided.

Design of support pillars

In situations where support to the ground overlying excavated areas has to be provided by a system of pillars, the support pillars must be designed in such a way that they do not fail, regardless of the extent of mining. In the last thirty years or so, considerable amount of research work has been done in the design of pillars and it can be claimed that now pillar workings can be designed to yield optimum recovery commensurate with the long term stability of the pillars. It is hoped that accidents due to pillar collapses should now become a thing of the past.

Jeetpur Colliery | Firedamp Explosion | 48 Fatal | 1973

Date of the Accident	:	18/03/1973
Number of persons killed	:	48
Owner	:	Indian Iron & Steel Co. Ltd.
Place	:	Jharia Coalfield

A firedamp explosion occurred in 14 seam workings at about 8 p.m. on 18th March 1973 in which 48 persons were killed. It was a predominantly methane explosion. Coal dust took very little part in it. Participation of coal dust in a big way was averted because adequate stone-dusting had been done & stone-dust barriers had been provided which operated successfully to arrest the spread of explosion.

14 seam is a gassy seam of the third degree. Methane emission from the seam was measured in June 1972 and was found to be 6 m3/min which gave an emission rate of 13.45 m3/t of daily output. All electrical apparatus installed in the seam were of flameproof construction. 18th March, being a Sunday, was the weekly day of rest. The next day (19th March) was also a holiday on account of the "Holi" festival. Items of work which could not be done on working days were normally detailed for execution on Sundays and holidays. Such work included checking and maintenance of heavy items of underground equipment, extension of conveyors, erection of stowing barricade, attending to stowing ranges, checking and re-setting of supports, etc. On this occasion, as two consecutive non-working days were available, a major item of work, namely, installation of a shaft cable from 16 seam inset to 14 seam, was also taken in hand. The cable laying job was planned in consultation with the Agent, Senior Manger and Senior Engineer. According to the programme, the cable was to be put on a special cable reel kept in the cage at J-3 pit-top in the first shift. For transferring the cable to the reel, the two air-lock doors at the pit-top had to be kept open and the main ventilator on J-3 shaft was to be stopped for about 1.5 hours. As the Senior Manager was on leave, permission to stop the fan for 1.5 hours was obtained from the Acting Manager. The work of transferring the cable to the special reel took longer time than expected and the fan was kept stopped for 3 hours from 1030 hrs to 1330 hrs The fan was re-started at 1330 hrs but shut down again at 1410 hrs, that is, after working for only 40 minutes. No evidence could be gathered as to the circumstances under which the main fan was again stopped at 1410 hrs or who ordered the stoppage.

The second shift started at 1600 hrs. 87 workers were deployed in 14 seam for routine maintenance jobs and 10 workers were engaged for the cable laying job. Nobody bothered to verify whether the main fan was working or not. The fan continued to remain shut down till 2010 hrs, that is, for 6 hours. As a result of the shutdown of the main fan, there was practically no ventilation in the 14 seam workings. The explosion occurred at about 2000 hrs. The fan log book showed that the fan was re-started at 2010 hrs. No evidence was available as to who ordered the re-starting of the fan. The prolonged stoppage of the fan resulted in accumulation of methane in the rise side galleries. While the main fan had stopped, the auxiliary fans continued to run and re-circulation of air by the auxiliary fans must have helped in forming a uniform methane-air mixture in the workings.

In order to determine the source of ignition, the Court adopted the process of elimination. From among the different possible sources, the Court ruled out shotfiring and sparks produced from coal-cutting machine on the ground that as it was a rest day, no coal-cutting or shotfiring had been done. Underground fire and naked flame were eliminated on the ground that the rescue teams had not found any evidence of an underground fire or any naked light or anyone smoking. None of the parties to the inquiry had suggested with any seriousness the possibility of a damaged flame safety lamp or cap lamp as the source of ignition. The Court was left with two other possible causes, namely, frictional sparks and sparks from electric apparatus. The management's contention was that the ignition was caused by frictional sparks produced by a roof girder falling over a metallic chute. The management had put forth the theory that the stoppage of the main fan was not responsible for the disaster to any significant extent. According to them, there was a release of large volume of gas consequent to a roof fall. The gas was ignited by a frictional spark caused by a steel girder falling on a steel chute. After examining all the evidence available and taking opinion of scientists from CMRS, the Court concluded that the management's postulation was far-fetched and

founded on imponderables and was therefore untenable. The roof-fall was more likely to be a result of the explosion rather than its cause. The investigations carried out by DGMS indicated that the probable cause of ignition was a spark from an electric apparatus. During the course of investigation after the explosion, officers of the DGMS had found a drill panel lying in an open condition in the affected workings. The front cover of the drill panel had been opened out and kept on the ground. The incoming PILCDWA cable had been pulled out from the terminal box and the drill panel thrown over 1 m from its original location. Dead bodies of 3 electricians and a helper with severe burn injuries were found lying near the drill panel. Accordingly, it was concluded by the DGMS that the site of ignition was near the drill panel. The direction of travel of the flame and the violence caused by the shock wave (as evident from the deposition of soot and devolatised coal as well as from a survey of the position of fallen roof supports & displaced machinery) also pointed to drill panel being the starting point of the explosion. Subsequent investigations on the drill panel by CMRS had confirmed that work on the drill panel was being done without cutting off the power supply. The Court agreed with the findings of the DGMS.

Violation of Rules and Regulations

CMR-132(2): The main ventilator was stopped in the second instance at 1410 hrs without any authority from the Manager.

CMR-134: In the event of stoppage of main mechanical ventilator, all persons present belowground shall be withdrawn from the working places to the nearest main intake airway and at least 270 m from the nearest working face (or to the downcast shaft bottom if it is less than 270 m from the nearest working face). If the ventilator is not re-started within a period of one hour from the time of its stoppage, all persons shall be withdrawn from the workings belowground. However, officials and persons engaged in supervisory duties, pump attendants and persons employed in essential and urgent repairing work may be permitted by the manager (or, in his absence by the senior official of the mine) to remain belowground if he is satisfied that the places where those persons are to work or to pass are adequately ventilated during this stoppage of the ventilator and gives an order in writing to that effect. The Engineer shall arrange to have the electric current cut off from all apparatus belowground except from such apparatus as are located in the main intake airway at a distance of more than 270 m from the nearest working place.

CMR-137(1): Every auxiliary fan shall be installed, located and worked in such a manner that: (i) a sufficient quantity of air shall, at all times, reach it so as to ensure that it does not re-circulate air; and (ii) there is no risk of the air which it circulates being contaminated by any substantial quantity of inflammable or noxious gases or dust. In this case, the first provision was violated by the stoppage of the main ventilator and the second by the continued operation of the auxiliary fans re-circulating the inflammable gas emitted from the headings they ventilated.

CMR-140(4): “Whenever there is any interruption of ventilation by the stoppage of any mechanical ventilator, including an auxiliary fan installed belowground, the official incharge of the mine or part shall immediately take precautionary measures including withdrawal of men, if necessary, against dangers that may arise out of non-compliance with the provisions of Regulation 130 to restore the ventilation in the mine or part” In this case, neither were the men withdrawn nor was any attempt made to enforce the standards of ventilation as provided under Regulation 130.

IER-126: provides that electricity should be cut off during the period required for examination or adjustment of the apparatus which would necessitate the exposing of any part liable to open sparking; or if in any part of the mine, the percentage of inflammable gas in the general body of the air is at any time found to exceed 1.25%. The disconnection and re-connection of the supply shall be noted in a log-sheet and reported to the Inspector. This was not complied with.

IER-122(e)(ii) : stipulates that the cable end should be efficiently sealed so as to prevent diminution of its insulating properties. In a few cases which were inspected, the cable terminal boxes were not found to be filled with cable compound, thus violating the provisions under the above rule.

Mines Act-S-48(4) & (5) & Mines Rule-78(1) & (2): Four workers of the contractor who had actually gone down 14 seam were not shown as present in Form-C register.

Recommendations

- The circumstances leading to the explosion clearly indicated a lack of knowledge on the part of mine officials about their duties and responsibilities under the Regulations and Standing Orders. For instance, the engineering staff did not realise that the main fan could not be shut off for any length of time without specific permission of the Manager. There was also a good deal of confusion about the respective responsibilities of the Acting Manager and the Assistant Manager when the former was away from the colliery in the afternoon. It is therefore recommended that all senior and supervisory officers who have duties and responsibilities laid on them by the Regulations and Standing Orders should be made fully aware of them. This task should be taken in hand by the senior management.
- The Regulations should require that the permission to stop the fan should be obtained in writing from the Manager or a person authorized by him.
- When fan stops for reasons outside control of management, the fact of stoppage should be recorded in fan register and initialled by the Manager in token of his having been informed.
- On the day of the accident most of the senior officers claimed that they were off duty. To correct this situation, a regular roster of officers who would be on duty on weekly days of rest and holidays should be prepared. The concerned officers should be told clearly what their duties and responsibilities are for that day. The officers on such duty should be suitably compensated for the additional workload.
- The safety set-up for the mines needs a complete reorganisation. At present the safety officer and ventilation officer function as direct subordinates to the manager and very often they are employed on production work.
- The safety set-up should be organized on the pattern of internal audit. A separate cadre of safety and ventilation officers should be created. Every Area should have an Area safety officer and the colliery safety officer should be under his administrative control. The safety officer should function as the principal advisor to the manager on safety matters. However, the manager should remain in complete operational charge of the mine and it would be for him to decide whether or not to accept the advice of the safety officer. At the same time the safety officer should have the right to report direct to the Area safety officer who himself should be a direct subordinate of the Technical Director.
- There is a need to re-define the functions of the DGMS by placing emphasis on three aspects of their duty, namely:
    - ✓ to set standards of safety;
    - ✓ to advise production authorities on specific practices adopted by them; and
    - ✓ to bring to the notice of the production authorities, through regular inspections, the standards of safety actually followed in mines. The DGMS should function more as consultants, friends & advisors rather than as prosecutors and enforcement agents.
- To create interest and a feeling of involvement in safety matters among workers and supervisors, Pit Safety Committees should be activated.
- To take care of power failures resulting in stoppage of main fan and other essential services, alternative arrangements of power supply should be made, at least for highly gassy mines.
- Small thermal power stations of 50MW each may be set up at strategic points in coalfields.
- In this case the supervisory staff was not alert enough to detect the presence of gas with flame safety lamps. A more reliable system would be to install recording methanometers at important places in the mine.
- Similarly, air-velocity meters should also be installed to provide continuous record of the quantity of air flowing through each district.
- While the rescue services acted with commendable speed and efficiency in the present case, there is no doubt that difficulty of communication prevented the rescue authorities to reach the mine even earlier than they did. Therefore more feeder stations should be opened, particularly, near large and gassy mines.
- Self-rescuers should be introduced on a compulsory basis. If the miners had been provided with self-rescuers, they could have at least saved themselves from CO poisoning.

Chasnalla Colliery | Innundation | 375 Fatal | 1975

Date of the Accident	:	27/12/1975
Number of persons killed	:	375
Owner	:	Indian Iron & Steel Co. Ltd.
Place	:	Jharia Coalfield

375 coal miners were buried alive in the Chasnala colliery in Bihar when an 80ft roof of coal between them and an adjoining waterlogged mine collapsed without warning. A shroud of mystery still surrounds the actual cause of the tragedy but according to officials of the Indian Iron and Steel Company, the firm that owns the mine, this should never have occurred since they conformed to international standards. Yet, a 120 sq ft hole in the roof did form, letting in an estimated seven million gallons of water per minute.

Inrush of a large volume of water into the 13/14 combined seam workings of the new deep shaft mine from old abandoned incline workings in the same seam. The 13/14 combined seam is about 24 m thick and has a gradient of 1 in 1.5. There is a major dyke running through the property and the old workings in the 13/14 combined seam on the west side are separated from the east side workings by this dyke. On the west side the seam was worked through four inclines, namely 1, 3 (old) ,2A and 2; and on the east side through three inclines, namely, 3, 4 and HK Inclines. Both these sets of workings were developed in the pattern of levels, the various levels being developed on the bord & pillar system. These workings were abandoned in April, 1949 and had got water-logged in course of time. It was the workings of 3, 4 and HK inclines that caused the disaster. The deep shaft mine was started in the mid-1960s and was developed on the horizon system. The first horizon was located 172 m below the surface and the second horizon 291 m below the surface. Fig.-1 shows a schematic diagram of the old working of 3 & 4 Inclines. Incline No.3 was driven along the true dip of the seam while Incline No.4 was driven along an apparent dip direction. The plan of the old mine showed that the workings had stopped at K-level. However, after the accident and dewatering of the mine, it was seen that No.3 Incline had gone down to an inclined distance of about 6 m beyond K-level and No.4 incline had gone to an inclined distance of 49 m below K-level. The old workings were full of water from K-level to C-level and must have contained about 500,000 m3 of water. K-level had 118 m of head of water above it. The connection between the old workings and the new workings was made in horizon No.1 at the inbye end of 15 m long ventilation cross-cut being driven from the hangwall towards the footwall. PP1 represents the block of coal which had been dislodged from the base of No.4 Incline making the connection. (It may be noted that the end T1 of the foot wall drivage had already gone below the extension of No.4 Incline. The parting between the roof of the footwall drivage and floor of No.4 Incline at that place was only about 1.8 m. Fortunately no holing-through had occurred at that point). The puncture was about 2 m wide by 3 to 4 m high. About 1, 35,000 m3 of water flowed into the new mine until horizons 1 and 2 were completely flooded and water had risen in the two shafts to find its own level and stabilize. In the process, water level in the old workings had fallen to E- level. Later on, as water was pumped out from the deep mine through the shafts, the entire water of the old workings went down through the same connection until all of it had been pumped out.

Under the circumstances mentioned above, no one inside the deep mine at the time of the accident had any chance of survival. After the mine was dewatered, the first rescue team was sent down through Pit No.2 on 19.1.1976, that is, 23 days after the accident. As to the recovery of the bodies of the victims, only skeletons and bones could be taken out. The remains of some of the bodies could be identified by their cap-lamps, wearing apparel and/or by some materials like keys, knives, etc. However, most of them could not be identified because cap-lamps were not found attached to them. According to the opinion of the Reconciliation Committee, the number of bodies recovered was somewhere between 374 and 380. Therefore the Court had no reason to disagree with the figure of 375 persons as given by the management.

Sudamdih Colliery | Firedamp Explosion | 43 Fatal | 1976

Date of the Accident	:	04/10/1976
Number of persons killed	:	43
Owner	:	Bharat Coking Coal Ltd.
Place	:	Jharia Coalfield

A firedamp explosion occurred in the 400 m horizon workings of XV seam on 4.10.1976 at about 0840 hrs. The explosion occurred between the second and third rises. There were four closed holidays (30.9.1976, 1.10.1976, 2.10.1976 and 3.10.1976) on account of Durga Puja immediately preceding the accident. The XV seam is 6 to 7 m thick and has igneous intrusions which have burnt the coal to "jhama" at places. Gas survey conducted in May 1973 had shown a gas emission of upto 8 m^3/min and it was classified as a gassy seam of the third degree. The depth of the seam in the area of the accident was about 400 m. The dip of the seam varied from about 27° to 60°. The 400m horizon workings are entirely below the river Damodar. The seams at Sudamdih have been opened up on the horizon system of mining. Three horizons, namely, 200m, 300m and 400m, have been developed to work XV, XIVA, XI/XII and IX/X seams. Rises at 100 m intervals have been driven from the lower to the upper horizon to form blocks of coal for subsequent extraction. All roadways are driven by blasting off-the-solid. In the XV seam, companion galleries to the main lateral gallery are driven off these rises leaving coal blocks of 25 m to 30 m. Room rises at 10m intervals are driven from the lowest companion to the next higher companion. Thus in each wing of the block, 10 rooms can be formed. The cross-section of these room rises is 3 m x 2 m. Each room is widened to a total width of 7 m and heightened upto the main roof which is normally 7 m from the floor. Extraction of the room is carried out from dip to rise with solid blasting. This method of extraction is called the "Komora" method. The rooms, when regular extraction of coal commences, are referred to as "Komoras ". Complete extraction of a "Komora" normally takes 15 days. After extraction, the "Komoras" are stowed with sand.

The last working shift before the accident was the third shift of 29.9.1976. Normal mining operations were suspended during the holidays. Many of the officers, including the General Manager, were on leave during the Puja period. However, due to various reasons, during the entire holiday period, only one officer (an Under Manager) visited the XV seam workings in the third shift of 1.10.1976. No officer went underground on 2nd and 3rd October. On 3rd October the Under Manager and Mining Sirdar who were on roster duty in the second shift left the mine at the end of the shift without waiting for their respective relief. In the third shift, neither the Under Manager nor the Mining Sirdar came for their roster duty. Both pleaded illness in their evidence. The mine Time-keeper also failed in his duty to inform senior officers that no one had turned up for roster work in that shift. The result of these lapses was that no check on the auxiliary fans was made by anyone at least during the last shift before the mine reopened on the morning of 4th October. It was subsequently found out that out of the six auxiliary fans in the affected area; at least three did not work at least in the third shift on 3.10.1976. Stoppage of auxiliary fans had caused accumulation of inflammable gas in a number of places. On 4th morning, either the working places were not checked for gas before employing the workers or, even if they were checked and gas was detected, persons were not evacuated before starting the fans. An explosive mixture was formed and the explosion occurred within a few minutes of the starting of the fans.

Factors leading to the explosion

- Gas accumulation: The likely places of gas accumulations were identified as: 400 m lateral, 4th rise, 3rd rise, 6th room-rise and 3rd companion. The faces of 3rd rise and 3rd companion had been blasted in the last shift of 29.9.1976 before closure for Puja holidays. Fresh exposure of coal and broken coal would have contributed to some increase in gas emission in these places. There was also a possibility of some gas accumulation in the three "Komoras" due to the construction of barricades for stowing and the 4th , 5th , 6th , 7th and 8th room-rise due to inadequate air flow. Court thus came to conclusion that the explosion occurred in the zone between the 1st and 2nd companion bounded by the 2nd and 3rd rises.
- Source of ignition: It is unfortunate that the source of ignition could not be pin-pointed. No explosives were taken underground and locomotives did not travel in the affected area on the day of the accident. No flame safety lamp was taken to 400m horizon. Contrabands like matches or other sources of lighting were not

detected underground. Men were thoroughly checked for contrabands before they entered the cage. There was no evidence of any sparking or flashing in any of the damaged cap lamps recovered from the accident site. After all the electrical equipments in the affected area were examined by experts, the Court ruled out electrical sparking as a source of ignition. Sparks arising out of compressed air equipment were also ruled out because the two loading machines, which were the only compressed air operated equipment in the area, were not operated. Frictional sparking produced in auxiliary fans due to rubbing of blades against the liner or guide vanes was also ruled out firstly because in none of the fans, blades were found rubbing against the guide vanes and secondly, CMRS tests showed that rubbing of blades against the aluminum liner did not produce an incendive spark. DGMS suggested the possibility of fall of roof stone from the sill in 6th room-rise. The spark could also be produced by rubbing of a metallic part of the conveyor against a stone. One witness had heard a casualty saying that, "he was at the loading point at the time of the blast. Some machine was started and immediately thereafter came the big bang". After considering all the evidence, the Court was of the opinion that in all probability the ignition was caused due to rubbing of stone against the metallic parts of the conveyor when it was started.

Recommendations

- Some officers and supervisors of the mine showed good leadership and dedication to their duty towards their men. Risking their own lives, they went into the affected area immediately after the explosion, even without a methanometer or flame safety lamp, and saved a number of lives. Their conduct and behaviour deserve the highest praise.
- Proper arrangement should be made for supervision of the mine during holidays. At least in gassy seams of the third degree, all working faces should be inspected by an officer in each shift even on holiday. On the first working shift after a holiday, an officer should be deputed to check for gas in all parts of the mine before workers are allowed in.
- CMR-44(8) requires that a Sirdar shall not leave his district unless relieved by a successor. This provision regarding handing over charge by the Sirdars in the district (i.e. belowground) should be strictly enforced. Overmen should also be enjoined to wait until they are relieved. During rest days and holidays, persons on roster duty should also be required to go only after handing over charge to their successors.
- CMR-186 lays down that "no machinery shall be operated otherwise than by or under the constant supervision of a competent person". Quite often auxiliary fans are operated by miners. Competent persons should be authorized to handle these fans. They must ensure that the fans are started in proper sequence.
- An environmental survey should be conducted before the capacity and location of auxiliary fans are decided upon. The survey should take into account the possible ill effects of running an auxiliary fan on the neighbouring working places as well as the places being ventilated by the auxiliary fan. Such surveys should be carried out periodically even after installation of the fan as there can be variation in gas emission and air circulation.
- There were not enough methanometers and flame safety lamps in working order to meet the daily requirements of overmen and mining sirdars. This situation needs to be corrected. Even though methanometers are now in common use for detection of methane, the only equipment mentioned in the CMR is the flame safety lamp. The CMR should be suitably amended to make the use of methanometers lawful. It is recommended that additional precautions for Degree III mines should be taken by installing an automatic multi-point methane recorder. Additionally, automatic methane alarms should be placed at all faces where gas is likely to accumulate.
- There are no clear instructions as to who should take control of rescue and recovery operations in an emergency. In this case no one seems to have performed this duty effectively. In the view of the Court this responsibility should be given to a committee consisting of a senior officer of the mine (who has detailed knowledge of the mine), a representative each from DGMS, Rescue Station and the recognised Trade Union. This committee should take decisions and direct operations from the Control Room. In each mine there should be a standing order with regard to the action to be taken when there is an accident. Also there should be definite emergency plans for every mine and rehearsals should be undertaken periodically for evacuation, rescue operations, etc.

Baragolai Colliery | Gas Explosion | 16 Fetal | 1979

Date of the Accident	:	22.1.1979
Number of persons killed	:	16
Owner	:	North Eastern Coalfield, Coal India Ltd.
Place	:	Dibrugarh District (Assam)

Baragolai Colliery consists of the Baragolai underground mine and small manual quarries at Tikka and Namdang Sections. The coal deposit at Baragolai is in the form of a syncline with its north limb inclined at 30° to 33° and the south limb having a steeper dip of about 70°. There are 5 coal seams with a number of thin seams occurring in patches. The area receives 250 to 350 cm of rainfall annually and the mines are highly watery. The underground workings are approached from the surface by a pair of cross-measure drifts (adits), each about 1.6 km in length and driven from; the foot of the hill at zero level to touch the north limb of the syncline. One of the drifts has been continued to touch the south limb and surface connections are made in the 20 foot seam. In the north limb 5 dip entries have been driven upto 8 level and levels are opened on either side, east and west. In the 60-foot seam, development and depillaring are done in close succession and at the time of the accident two depillaring districts were working, one on the eastern side where coal was extracted between 4L and 5L and another on the western side where coal was extracted between 5L and 6L. The method of extraction, known as “Bhaska” method and practiced only in this coalfield, consists of splitting the pillars into stooks of 10m x 10m and then widening and heightening the galleries to form self supporting dome structures. The two main adits act as intakes as well as drainage outlets for the 60-foot seam. One of these adits, being the main haulage roadway: connects these entries to the workings below. There are 5 dip galleries going down below zero-level: 3 are used for hauling coal tubs upto zero-level, one is used for traveling purpose and the fifth carries the water pipes. Ventilation of the underground workings is effected by a main surface fan in a drift near Namdang Inclines and it ventilates the development – workings of the 20-foot and 60-foot seams as also the depillaring districts in the 60-foot seam. Three booster fans help to ventilate the different districts. In addition, there are 3 auxiliary fans.

The source of gas was a large cavity in the roof. Gas accumulated in this cavity and was pushed down by a further roof fall in the cavity. The source of ignition was an arc from the live electric cable which was cut by steel supports dislodged by the roof fall. This roof cavity had not come to anybody’s notice as it was covered by steel arches and corrugated steel sheets. The existence of the cavity had been established only by noting that the volume of debris from the roof fall was much less than the volume of the void left behind as a result of the fall. At about 8.30 a.m. on 22.1.1979 there was a fall of roof measuring about 7 m x 3.3 m in a cavity in the cross-measure drift resulting in increase in the height of the cavity to 7 m and exposing a portion of a 1.3 m thick coal seam and another 0.2 m thick coal seam. This fall in the cavity dislodged steel channel sets, corrugated steel sheet coverings, rail and timber pieces. The steel and timber pieces which fell down damaged a live cable in the drift and caused it to emit an arc. The arc ignited the gas pushed down from the cavity by the fall of roof. The flame of the gas ignition developed rapidly and moved swiftly towards the north. 3 workers who were near the haulage engine in the drift came in direct contact with the flame and were severely burnt and died in a short time. Five other workers who were in the zero-level also sustained bum injuries. One of them died later.

The products of combustion containing poisonous carbon monoxide gas travelled along zero-level west and went down all the 5 dip galleries. About 250 persons were present below zero-level at the time of the accident. They got the pulsation of the mild pressure wave due to the explosion and at some places smoke was seen coming in. They all got panicky and attempted to go up to zero-level. 50 to 60 of them chose to go up through D2 haulage roadway which was the shorter route whereas the others followed the advice of the overman and took the usual travelling roadway. The workers who took the steeper haulage roadway met with smoke some way up and were overcome by CO, 12 of them died on the spot, the rest were partly unconscious and some of them were found to have rolled down the dip. All those who took the usual travelling roadway route were not affected at all. Though the haulage roadway was also the intake, it was

affected due to choking of the south limb tunnel due to roof falls. Later, the haulage roadway was found to have been cleared of poisonous gases by 9 a.m. i.e. within half-an-hour of the explosion.

The Court concluded that neither the management nor any individual person could be held responsible for the accident.

Recommendations

Self-rescuers: Self rescuers should be issued to all underground workers. Steps should be taken to manufacture self-rescuers indigenously so that the needs of the industry are met within as short a period of time as possible. With the nationalization of the coal industry, CIL should take the initiative for encouraging indigenous manufacture of the equipment. Training should be given to all workers in the use of self-rescuers and those who have been issued the rescuers must be persuaded to use them.

Alternate source of power: On the day of the accident, the main fan had stopped at 6.45 a.m. and again at 8.20 a.m. for short periods. Although the stoppage of the fan did not in any way contribute to the accident, the Court recommended that the management should take action to provide a stand-bye generator or a separate transmission link as soon as possible, so that alternate source of power to the main ventilator is available immediately.

Parties to DGMS inquiries: A representative of the management and a Workmen's Inspector should be associated with inquiries conducted by DGMS officers.

Operation of earth leakage devices: While looking into the possible sources of ignition, it was brought to the notice of the Court that the time taken for operation of earth leakage device was 1/50 of a second whereas an ignition could take place if sparking in an inflammable mixture lasted for 1/250 of a second. In the present case it had lasted for a minimum time of 1/50 of a second and it was adequate for igniting the gas mixture. To reduce incendive sparking it seems desirable that studies and investigations are undertaken to minimize the time for operation of earth leakage devices. It would appear that this time could be reduced to as low as one millionth of a second. Appropriate authorities and agencies may take up this matter for investigation.

New Kenda Colliery | Coal Fire Disaster | 55 Fatal | 1994

Date of the Accident	:	25/01/1994
Owner	:	Eastern Coalfields Ltd.
Number of persons killed	:	55
Place	:	Raniganj Coalfield

On 25.1.1994 at about 3.30 p.m. a fire broke out in the workings of Dobrana seam at New Kenda Colliery. The fire occurred in the main intake airway close to the downcast shaft. Smoke and noxious gases from the fire spread to the working places and caused the death of 55 persons. This has been the worst fire disaster of this century in Indian mines.

Two seams, namely, Kenda (8.31 m thick) and Dobrana (5.4 m thick) were being worked through shafts. The upper Kenda seam had been opened sometime in 1907 and had been developed extensively. At the time of the accident, it was being depillared in conjunction with hydraulic sand-stowing. The Dobrana seam, lying 55 m below Kenda seam, was started in the year 1962 and had been extensively developed through Pit nos. 2 and 3. The area on the rise side of the west shaft-levels had been depillared mostly by caving more than 10 years ago. The rise-side goaves were isolated by fire-stoppings with provision for water drainage where necessary. At the time of the accident, the seam was being developed on the south-west side of Pit nos. 2 and 3. The Dobrana seam has been classified as a gassy seam of the second degree but no occurrence of gas had ever been reported. Coal is very cleaty and its crossing point temperature varies between 145°C - 155°C. Although seam had been extensively depillared with caving in past 20 years, there had been no case of fire in the seam. The seam is therefore considered only moderately susceptible to spontaneous combustion. However, the Kenda seam at this colliery had several occurrences of heating and fire.

The fire in the 'zero' west level of Dobrana seam on 25th January was apparently caused by spontaneous heating of the roof coal although there was no indication of self-heating before the occurrence. The large quantity of air flowing in the roadway might have diluted the symptoms of heating like smoke, stink, CO and heat to innocuous levels. Hot and burning coal appears to have fallen down from the roof and on being exposed to the large quantity of flowing air; it produced smoke and noxious gases profusely. Although normally it was a busy area, nobody was present near the spot where the burning coal fell down and the fire could not be tackled immediately. Water was not available to quench the fire. Pumps in the main sump could not be operated due to a cable fault. Attempts were made to quench the fire by throwing some stone-dust but were not successful. Subsequently Nitrogen was used in both liquid and gaseous form but it failed to extinguish the fire which kept burning like a furnace. Finally the fire area was sealed off in the middle of February enclosing 'zero' and 1 west levels. The plan shows the fire seals numbered 1 to 27.

As the fire area had already been sealed, the Court of Enquiry constituted to find out the causes and circumstances of the fire, could not make any progress for quite some time for lack of any direct evidence. After about one and a half year when the fire had died down, the area was reopened and examined by experts. Heavy roof falls were encountered in the sealed off galleries. The fallen mass contained unburnt coal at the bottom with stones on top mixed with coal or coal ash. The stones consisted of shale and sandstone which were subjected to various degrees of heating or burning. Different parties had attributed the following three reasons for the fire-

- Short circuiting or bursting of electrical equipment of the underground sub-station.
- Fire travelling from the rise-side goaf by breaking open No.8 isolation stopping.
- Spontaneous heating of the roof coal.

All electrical equipment and cables were examined by experts after re-opening of the area. The equipments were found in their respective positions and were in tact. There was no sign of any explosion.

The possibility of fire travelling from the adjoining goaf was ruled out as three witnesses who were standing near the said stopping at the time of the accident had heard a loud sound and seen smoke coming from the eastern side. Moreover, the rescue team which had entered the goaf after breaking No.7 stopping had not

found any evidence of fire inside the goaf. In fact they had found in tact wood and coal just below No.7 stopping. The wood and coal showed no sign of burning.

The fire was caused by spontaneous heating of roof coal in 'zero' west level. Spontaneous heating started in the top 25 cm of the roof coal. Because of the cooling effect of 2800 m3/minute of intake air, the heating could not have started anywhere lower. The 25 cm coal band had shale both above and below and therefore the fire remained confined within the 25 cm coal band. This fire had spread towards the west and north sides, helped by partial crush of the coal and air supply. The fire had a much larger horizontal spread than the usual roof coal fires. This large horizontal spread acted as a bed-separation for the overhanging shale and coal below. To this was added the dead load of the heat-affected shale above. The roof thus gave way before the fire could surface along the ledge of top coal. When this fall occurred at about 3.35 p.m., a large area of burning coal was exposed to a large volume of air resulting in rapid spread of fire.

Observations

- No telephone communication was in operation between the end of the haulage system and the pit-bottom and pit-top as required by CMR 87(4) (b). Had such communication been available, the workers could have been told to come out through the West side and a good number of lives could have been saved.
- If water had been used initially on the hot mass that fell from the roof, possibly the fire would have been quenched. But there was no arrangement for water supply in the gallery. This was in gross violation of CMR 120(1) (a).
- As the fire had occurred close to the downcast shaft, the fan should have been stopped or reversed promptly. The management would then have got sufficient time to rescue persons working inbye. It appears that nobody was ready to take upon himself the responsibility of this decision. They only tried to fight the fire through small attempts.
- Workers had not been provided with self-rescuers in contravention of CMR-191D. If workmen had been provided with self-rescuers, they would have got at least half-an-hour or more time to escape.
- The rescue plan showed an escape route but this was neither well-marked nor kept clear and secured. The workmen had no idea of this escape route. Another route to No.2 Pit was also available through the eastern side. The workmen could have used this route and saved themselves, but it appears they were not aware of this route either. Twenty six dead bodies in sitting posture were found at a place within 350 m of Pit No.3. Had these persons taken courage to move forward towards Pit No.3, they had a chance of saving themselves. But without doing so, they sat together and probably were conferring on their own fate. Obviously, the workmen were not made aware of the mine layout.
- Large areas belowground in this mine have been developed unsystematically. This is undesirable. The government should frame regulations to ensure systematic development of underground mines.
- Risk of fires in mines has not drawn serious attention of the management. Effective arrangements to deal with the fire immediately are lacking. A comprehensive regulation defining the role of the controlling authority and specifying the emergency response mechanism and method of fire fighting is needed.

Gaslitand Colliery | Inundation | 64 Fetal | 1995

Date of the Accident	:	27/09/1995
Number of persons killed	:	64
Owner	:	Bharat Coking Coal Ltd.
Place	:	Jharia Coalfield

Rising water of the flooded Katri River breached its embankment and entered underground workings through galleries exposed in the worked out quarry. Gaslitand mine, situated on the bank of Katri River, is one of the oldest mines in the Jharia coalfield, having been started in 1896. The present Gaslitand Colliery was formed by amalgamating Union Angarpathra Colliery (started in 1903) with Gaslitand after nationalization in 1971. Extraction of coal over a prolonged period had resulted in lowering of the ground level which at places was even lower than the bed of the river. It had also caused cracks to develop allover the surface and even in the river bed.

There was an unusually heavy rainfall on the night of 26th September which surpassed all previous records. Against an average rainfall of 1350 mm per year in the Jharia Coalfield, rainfall of 330 mm was recorded on 26th September. The rain had started as a light drizzle at 4 p.m. and soon turned into a heavy downpour from 6 p.m. In just 3 hours between 8 p.m. and 11 p.m., a rainfall of 210 mm was recorded. Strong winds accompanied the rain. At 9.15 p.m. there was complete electrical power failure and the entire area was plunged into darkness in the stormy night. All machinery and equipment operated by electricity, including the main mechanical ventilator, stopped functioning.

The level of water in the Katri River was rising menacingly and must have crossed the danger mark and the withdrawal mark by 10 p.m. but unfortunately on that fateful night no guard was on duty in the second shift to keep a watch on the level of water in the Katri River. While some of the neighbouring mines had withdrawn all persons working below ground by 10 p.m., the management of Gaslitand Colliery remained insensitive to the impending danger and failed to take this basic precaution.

The steam winder of 6 pit had worked upto 10.15 p.m. but thereafter the winding engine driver refused to operate it because there was an accumulation of rain water below the drum which was splashing on to him. He made no effort to bailout the water and neither he nor the banksman took any steps to inform their superiors. Both of them left their places of duty without handing over charge to persons of the next shift.

There were 3 boilers for supplying steam to the winder: two Lancashire boilers and one vertical boiler. One of the Lancashire boilers was under repair. The vertical boiler turned cold in a short time. As the sinder did not operate after 10.15 p.m. steam was not required. It appears that the Lancashire boiler was not stoked and fed with coal after 10.15 p.m. and the adverse weather reduced the steam pressure to much below the operating pressure.

As the main mechanical ventilator had stopped running due to power failure at about 9.15 p.m. apparently all the persons belowground had gathered at the pit bottom of 6 pit by about 11 p.m. and were giving signals to raise them. But their signals remained unattended. These persons did not go to the seconds outlet (No.4 Pit) because they knew that it was not operational. The mine had only four winding engine drivers of whom three were on duty in the three shifts at 6 Pit. The spare driver, as and when available, was used at No.4 Pit. So, in effect, No.6 Pit was only means of access and egress for this section of the mine. On being informed of the dangerous rise in water level of Katri River by the river guard of the third shift, the manager and safety officer rushed to the mine at about 12.30 a.m. The manager instructed the safety officer to stay at 7 Pit and arrange to withdraw the 6 persons employed in that section. He himself proceeded to 6 pit to supervise withdrawal of person there. But he found that the steam pressure was not adequate to operate the winder. He then came to the boiler house. It was about 1 a.m. when he reached the boiler house. Efforts to generate steam on an emergency must have started only thereafter. But it was already too late. At about 1.30 a.m. a sudden gust of cool air forced its way up through 6 Pit. The current of

air became stronger and soon it came out with great violence shaking the entire headgear structure. The cage at the pit-top was lifted up and resulted in a violent overwind. The sound of water entering the pit with great force could be heard from the surface. The manager could sense that the mine, was flooded and everything was lost.

It appears that the break in the embankment took place at around 1.15 a.m. and the river entered the old quarry. The water must have been impounded by the retaining wall for sometime but very soon it was washed away and the water entered the old disused quarry which was connected to below ground workings. Water rushed into the underground workings resulting in violent expulsion of air through 6 Pit. The cage at the pit bottom was carried inbye by the force of the water, causing the violent overwind of the cage at the top. The entire mine must have been completely filled up with water in a matter of minutes drowning all the 64 miners who were belowground at that time.

No assistant manager or under manager or overmen had been posted in the, second shift. There was total lack of coordination and absence of discipline culminating in the winding engineman not operating the winder in spite of receiving signals from belowground and the banksman and attendance clerk not taking any action to correct the aberrations. The fireman also stopped maintaining steam pressure in the boiler. Obviously, the mine was being worked in total violation of the safety regulations and standard procedures. This tragic accident has brought into focus the dangerous state of affairs existing in BCCL mines. That 64 valuable lives were lost is not a measure of the magnitude of this disaster. The moot question that needs to be answered is how could such gross violation of safety norms and criminal negligence of duty be allowed to occur in a mine belonging to Coal India, Ltd.

Godavarkhani No. 7 LEP | Innundation | 17 Fatal | 2003

Date of the Accident	:	16/06/2003
Number of persons killed	:	17
Owner	:	Singareni Collieries Company Ltd
Place	:	Andhra Pradesh

The details of major findings of the Court of Enquiry in the aforesaid mine is as follows-

- Large quantity of water, estimated to be several thousand gallons, had accumulated in panel No.3S/SS-1A in No. 3 seam bottom section which was extracted in the year 2000 by splitting as final operation in conjunction with hydraulic sand stowing. The accumulation was due to inter- granular space in sand, shrinkage of stowed sand with time, inadequate stowing.
- In an area, which was declared non-workable by the owner in 1999, development in 2 dip district in No.3 seam top section was started in April, 2003.
- This 2 dip development district in No.3 seam top section was being worked within 60 metres of the No.3 seam bottom section workings in panel No.3S/SS-1A. This work was done without taking prior permission from the Regional Inspector of Mines and without taking due precautions against the danger of inundation arising out of working close to water-logged workings.
- The parting between top and bottom sections of 3 seam which was to be kept atleast 5 metres, got reduced by roof falls occurring in 3 seam bottom section along the 2 metres throw fault plane. The parting must have been reduced to a few centimeters just before the rupture.
- The head of water, which was calculated to be about 15 metres, was enough to cause the rupture leading to sudden inrush in top section.
- The water rushed along 18L through the puncture in the form of a wall of a height of about 1 metre. After travelling southwards, it entered No.2 dip where 17 workers who were working in and below 19L and who were drowned in the inrushing water.
- Lack of supervision in mining in general and stowing of sand in particular.
- There is no system in place whereby after stowing any responsible officer would certify that stowing was proper and adequate before the district could be closed.

Godavarkhani No. 8A Colliery | Goaf Fall | 10 Fatal | 2003

Date of the Accident	:	17/10/2003
Number of persons killed	:	10
Owner	:	Singareni Collieries Company Ltd
Place	:	Andhra Pradesh

Extraction in panel No. 46B was started on 17th July, 2003, while extraction in adjoining panel No. 46A on the South Side, was still continuing. Panel No. 46A was sealed off on 30-9-2003. Panel No. 44 on the dip side and panel No. 41 on the North side of panel No. 46B had been extracted long ago. If whole pillars are considered, then line of extraction was diagonal. However the permission under Reg.100 required diagonal line of faces i.e. faces in the line of extraction should have been diagonal. But as already mentioned earlier, one half pillar to the South-east of the slice, where the accident occurred, had been extracted fully ahead of the diagonal line. Thus, in the truly diagonal line of face extraction, part of the load, which would have been borne by the half pillar, shifted to the rib at the site of accident.

The first local fall occurred in night shift of 14.10.2003 followed by second one in night shift of 15.10.2003 and the third fall occurred on the night shift of 16.10.2003 causing the accident. The exposed area in the goaf was 5160 sq. m at the time of accident.

Code of practice for induced blasting to bring down the hanging goaf should that exceed 4000 sq. m not followed in the sense that depth of shot holes had been reduced and also the additional shot holes for induced blasting parallel to the goaf required to be made when the hanging goaf are exceeded 4000 sq. m. were not completed in quick time. Reduction of rib also appeared to be more than what could be considered judicious for the situation. From the deposition before the Court and during the statutory inquiry by DGMS and also available records, it is apparent that there were indications of weighting in the working areas prior to the accident. Under the given geo-mining condition, weighting followed by the floor heaving could be expected before the local falls and the main falls indicating redistribution of the stresses. Apparently, the management failed to read the indications correctly.

Extraction in panel No 46B had been started while extraction in panel 46A on the south side was still in progress. This accident occurred only about 16/17 days after adjoining panel was sealed off. So it can be safely concluded that movement in panel No. 46A had not completely stopped at the time of accident. Load transfer due to interaction of the stresses from the adjoining goaf probably led to the sudden dynamic loading for which the workers failed to get any early indication. In 2nd shift of 16-10-2003, 1st dip slice of 55-1/2 LS/9 Dip got connected to the goaf on the dip side and the rib on the south side was reduced by blasting. At about 1.00 A.M on 17-10-2003 (3rd shift of 16-10-2003), while loading of coal from the blasted rib was being done, in he presence of some coal-cutters, support personnel and the sirdar, a local fall occurred in the goaf which extended into the workings crushing the south side rib and ten persons were buried underneath it while two escaped with minor injuries.

Anjan Hill Colliery | Methane Gas Explosion | 14 Fatal | 2010

Date of the Accident	:	06/05/2010
Number of persons killed	:	14
Owner	:	South Eastern Collieries Limited
Place	:	Chhattisgarh

While four rescue trained persons inside the workings of no.III seam of the mine for assessment of mine environment and two persons for collecting air samples from the return of the mine, suddenly there was methane gas explosion in the mine followed by coal dust explosion. Explosion waves laden with black cloud of hot dust came violently through Adits A&B and Air Shaft which resulted in fatal injuries to six persons due to asphyxia and inflicted serious bodily injuries to 13 persons and minor injuries to 26 persons on surface. These persons were present in and around of the Adit B at that time. Nature of injuries was burn injury of various degrees and also injuries caused hitting against hard substances. Seriously injured eight persons succumbed their injuries in hospitals on various dates.

On the 2nd of May 2010 a routine gas sample from a sealed area detected 416 ppm CO and 43 ppm C2H4 (ethylene) and 0.09% H2. The next day on the 3rd of May 2010 0.27% H2 (2746 ppm) 138 ppm C4H4 and 1262 ppm CO was detected. 7pm that night 2000ppm CO had been detected. Rescue teams were arranged to strengthen the panel seals and construct a second row of seals to better isolate the panel. This continued over the 5th of May. On the 5th of May at 4:20 pm there was a sudden gust of air that came out under pressure for approximately 1 minute. Almost unbelievably there was no smell of any noxious gases in the air. A second gust of air occurred at about 8:15 pm. At 10:10 pm another gust of air came out of the mine adits, A and B. The third gust brought with it a burning smell of coal. A gas sample taken at 1:05 pm on the 5th of May from the main return detected 5521 ppm CO, 0.26% CH4, 1% CO2, 100 ppm C2H6, 68 ppm C2H4. Later that night >2000 ppm was detected in the return from III seam with a smell of petrol. On the 6th of May 2010 at 1:20 am a rescue team entered the mine to take gas samples. They had barely gone 30m when they were hit with a gust of air and dust cloud. Visibility was nil for 1 minute. There was no noxious gas in the cloud and the dust was not as hot.

On the 6th of May 2010 pot holes in the subsided area were found to be intaking air. One also had a flame burning. At 11:30 am the pot hole erupted and a 20 m flame burnt for approximately 5 minutes before subsiding to only 1m. At 11:30 am there was a violent explosion in the mine which propagated out to the surface. Killing 6 men underground, and 8 standing who were around Adit B. 28 were injured standing around the Adit. Rescue teams were sent underground on the 7th of May. This accident claimed the lives of 14 people.

Meghalaya “Rat Hole” Mine | Inundation | 15 Fatal | 2018

Date of the Accident	:	December 13, 2018
Number of persons killed	:	5 escaped, 2 confirmed deaths, 13 missing
Place	:	Ksan, Meghalaya, India

In 2014, Meghalaya’s yearly coal production was around 6 million tonnes. In 2014, the National Green Tribunal (NGT), a government body that handles environmental issues in India, issued an order banning mining in Meghalaya, specifically banning mining through the 'rat-hole' technique. But despite the ban, in subsequent orders following petitions by coal mine owners, the National Green Tribunal and the Supreme Court of India continued to allow transportation of coal dug prior to the enactment of the order on 17 April 2014. On 4 December 2018 Supreme Court again issued an order that the transportation of coal mined prior to the ban was extended to January 31, 2019. However NGT as well as anti-mining activists have pointed out that illegal mining of fresh coal still continues.

The Meghalaya mining accident happened on 13 December 2018, when 15 miners were trapped in a mine in Ksan, in the Indian state of Meghalaya. While five miners managed to escape, rescue efforts for the remaining 15 continued till 2 March 2019. The miners were trapped inside the coal mine at a depth of around 370 feet (112 meters) in Jaintia Hills district. The tunnel the miners were in flooded with water after they cut into an adjacent mine which was full of water from the nearby Lytein river. Service personnel from the National Disaster Response Force (NDRF) and the State Disaster Response Force began operations shortly after the miners were trapped. After a request for assistance from the district administration, teams from Coal India, Kirloskar Brothers, the Indian Air Force and the Indian Navy joined the operation to rescue the miners.

Rescue operations started on 13 December. Over 100 service personnel from the National Disaster Response Force (NDRF) and State Disaster Response Force were deployed to rescue the miners. 1,200,000 litres have been pumped out of the mine but this has not helped as rain during the rescue operations and water from the river continues to flood the mine. Divers have also been sent into the mine, but have only been able to reach a depth of 40 feet. Sonar systems as well as cameras have failed to detect the miners. The local administration had made a request for pumps and other assistance from state owned Coal India on 20 December 2018. But the communication was received by Coal India only on 26 December. On 28 December the Indian Air Force joined in the operations, airifting pumps to the site. Teams from Coal India and Kirloskar Brothers are also providing expertise. On 29 December, a 15-member diving team from the Indian Navy also joined in the operation.

Media reports appeared on 27 December that the miners may be dead on the basis of a statement by a diver of the NDRF, which mentioned the presence of a "foul smell" coming from the mine. The NDRF shortly after clarified that this did not mean the miners were dead, and the foul smell could be coming due to other reasons, such as "stagnated water".

After a petition was filed in the Supreme Court of India, the solicitor general, Tushar Mehta, informed the court that the rescue efforts were additionally difficulty because there were no blueprints for the 355-feet mine where the miners are trapped. Water flowing into the mine from the nearby river was also making the operation more difficult. The Indian Army and Navy decided to cease operations on 2 March 2019. The operation was one of the longest efforts to rescue miners in India. Only two decomposed bodies were found which were handed over to family members.

The Chief Minister of Meghalaya, Conrad Sangma, has called for regulation of mining in the state, admitting that illegal mining happens in the state. Meghalaya Police arrested the owner of the coal mine on 15 December 2018. Congress leader Rahul Gandhi criticised the Narendra Modi government over the issue.