Chapter———5

The Miike Coal-mine Explosion

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I. Energy-source Conversion and Coal-mine Labour

The Miike coal mine was first developed during the Meiji Restoration of 1868 and was nationalized in 1872. After nationalization it was government policy to use prisoners to work in the mines. In 1888 there were 3,102 people engaged in mining, 2,144 or 69 per cent of whom were prisoners. In 1890 the Mitsui Coal-mining Company bought the Miike mine from the government and continued to use prisoners to mine coal. It was normal to force these people to work like beasts of burden in a system which produced a minimum of expenses and in which there was no need to advertise for labour.

In fact, after the mine had been taken over by the Mitsui Company, the number of prisoners employed began to decrease, though it continued as a prisoner-based operation until 1930. Although the mine was operated under favourable natural conditions, the treatment dispensed to the labourers was very bad. Indeed, modernization of the mine began using prisoner-based slave labour.

When the Japanese military machine invaded China in 1931, many of the labourers working in the mine were taken as cannon-fodder. The resulting shortage of labour became acute and, in order to make up the shortfall, the company used Koreans and, later, Chinese prisoners of war. In reality these people were subjected to the same harsh treatment that had been meted out to the former prisoners.

In 1945, after Japan's defeat in the Second World War, the Chinese and Korean labourers were released from servitude in the mine. Japan's production of coal in 1941 was 56,470,000 tons, decreasing to 20,380,000 tons in 1946, a level that was 36 per cent of the 1941 total, just one year after the close of the war. The Miike mine was no exception to this trend, and the maximum production of 4,000 tons decreased to 300 tons in 1946.

In the post-war period the coal industry faced some very difficult problems. Even though it had an important role to play in Japan's post-war economy,

the occupation forces of the United States were not interested in the production of coal. Since the price of coal produced in Japan was much higher than the international price, the Japanese government had to provide supplementary aid to the industry, but in 1945, on the instructions of the occupation forces, this aid was cut. United States economic aid was invested in major industries which could expand on limited capital; aid to the coal industry was first reduced and then dropped completely after 1949. When coal prices went up as a result, the effects were felt in the electricity-generation and steel industries. The occupation forces abolished all limitations on the importation of coal and on the use of oil. With this, the fate of the coal industry in Japan was sealed.

In January 1950 the occupation forces issued a memo which allowed the importation of oil and the operation of a refinery on Japan's Pacific coast. At that time the Standard Vacuum, Caltex, Tide Water, and Shell oil companies had begun negotiations with companies in Japan for joint venture capital tie-ups. In the Middle East vast oil discoveries were being made, and the change from coal to oil as an energy source was going on all over the world.

Not only the occupation forces but Japanese economic circles welcomed the change from coal to oil. However, the coal-miners opposed the change because of a desire to preserve their jobs. The Miike coal mine became the centre of the opposition movement against this change. Between 1959 and 1960 disputes arose between the mining capitalists and the labour union, but the miners were defeated. In this instance about 1,200 miners were forced out of their jobs. After the defeat of the union movement, the switch from one energy source to the other came into effect very swiftly. Table 5.1 indicates that in 1955 coal as a primary energy source provided 50.2 per cent of energy needs, but that after the Miike dispute the level decreased, dropping to 16.4 per cent by 1975, while the use of oil increased from 20.2 to 73.3 per cent.

Through this rapid change in the energy picture, coal mines were forced to reduce prices and increase productivity in order to compete with oil as an energy source. Coal production at the Miike mine was 14 tons per labourer in June 1958, but this was increased to 44 tons per person as of October 1963. Mined coal was transported by a belt conveyor system, leading to an increase in coal production. In 1958 over 6,000 tons per day left the mine, rising to over 10,000 tons in 1962 and 13,000 tons by October 1963.

Table 5.1. Primary Energy Source Comparisons

	Oil	Hydro	Coal	Other
1955	20.2	21.2	49.2	4.0
1960	37.7	15.3	41.5	5.5
1965	38.4	11.3	27.3	3.0
1970	70.8	6.3	20.7	2.2
1975	73.3	5.8	16.4	4.5

Source: Resource and Energy Agency, *Sogo enerugii tokei.*

Table 5.2. Death and Injury Rate per 1,000 Man-days at the Miike Coal Mine

Year	Rate (persons)
1953	0.341
1954	0.424
1955	0.461
1956	0.598
1957	0.721
1958	0.810
1959	0.917
1960 November	0.406
1960 December	1.203
1961	1.403
1962	1.317
1963 August	1.415

Source: Kaneko Tsuguro, "Rodo saigai," *Kakaku* (October 1966).

Attendant upon the increased coal production, there also came an increase in coal dust in the mine, resulting in an ever-expanding risk of mine explosions. The coal-dust problem should have been made a priority, but in fact the importance of this problem was minimized as production increased. Twelve conveyor belts were installed in the first mine rationalization, with one person assigned to each belt drive motor and five charged with spreading water and rock dust in order to contend with the coal-dust problem. This brought to 17 the number employed to control the hazard, but with the dispute between the miners and the company this was reduced to two.

The Miike coal mine was then once again on the upswing, experiencing a great increase in production. Not only was there a decrease in the number of workers used for explosion security, but the number of coal-transportation and machine-operation workers was also reduced. The number of workers employed outside the mine was also decreased so that they could be used in the mine. As a result of these factors, many accidents occurred. In 1961, 16 labourers were killed, which was a higher toll than for any other year since 1951. Also, 1,922 persons were seriously injured. Table 5.2 provides an indication of the death-rate per 1,000 man-days. In November 1960, before the reorganization of the mine following the labour dispute, the death-rate was 0.4 persons per 1,000 man-days, but after the dispute it climbed to 1.2 persons. Leading up to the worst disaster in the Miike mine, month by month and year by year these death-rate figures increased.

II. Modernization of the Coal Mine and Labour Conditions

The increases in production levels at the mine produced an intensification of labour activity; the modernization and mechanization was motivated by the strong rivalry with the oil industry. Because of the mechanization of the

mining and product transportation methods, labourers suffered from ever-increasing hardships. The mechanization of the coal mine in the post-war era started in 1948 when a flat-bed-type belt conveyor was imported from the Federal Republic of Germany. If the speed of mining operations was too slow, the belt would not function properly, and this increased pressure on the labourers to speed up their extraction efforts.

In 1956, a coal planer was introduced from the Federal Republic of Germany. This equipment, which cut the bottom of the coal seam with its very sharp edges, made much deeper cuts than the equipment the miners had been using previously. Thus the coal wall, after being cut out by this new machine, would fall immediately on the conveyor belt and be carried away at once. The belt conveyor was forced up against the coal seam through the action of water pressure; then the belt conveyor with the coal planer was brought forward to the coal wall for cutting and immediate extraction. With the old method, dynamite was used to blow out the coal-seam wall, but the new system eliminated most of the intermediate mining processes.

Because of the introduction of this system, the speed at which mining took place was increased by a factor of two. The pillars that supported the ceiling of the mine had to be moved faster—water pressure was used to provide the locomotion necessary to move these supports. Also, with the use of pressurized water, the coal-seam cutter speed was increased by a factor of four. Because of this great increase in productivity all efforts had to be increased, from the coal-cutting processes to the coal-transportation systems.

With this came an increase in the activity of the miners as the pressures for increased productivity were brought ever more forcefully to the workplace. There was no room in the production schedules for the maintenance of safety or reduction of hazards. Mechanization meant that workers were forced to attend to one machine after the other in a very difficult subterranean environment. Under these circumstances, crisis conditions increased as mechanization progressed.

The working conditions in coal mines are so bad that any comparison with the worst conditions in surface factories provides no adequate understanding of the difficulties involved. The pressure on workers underground is such that they are under continual stress. When the pillars that support the roof begin to weaken, rocks fall and much injury results. There is also the risk of a sudden injection of underground water or problems produced by pockets of methane gas. Fire is the main hazard in both surface and underground mines, while rocks and water are also major sources of danger. Any crisis is magnified by the enclosed spaces that are an inherent aspect of underground operations. The transportation systems for taking out the coal and bringing in tools spread throughout the underground maze like a great spider's web, and hold the potential for even greater crises. Rocks fall on the workers, and the coal and rock dust produces any number of lung ailments. Increased productivity is bought at the cost of workers' health and safety. It was inevitable that the mechanization of the coal mine should result in a vast increase in the number of crisis situations.

Table 5.3. On-the-job Injury Rates for Different Industrial Sectors[a]

Year	Mining	Construction	Iron and steel	Metallurgy	Machinery	Chemical	Transport and communications
1955	76.67	47.28	20.98	34.00	23.12	14.21	17.83
1960	83.92	27.88	13.21	22.04	65.57	7.00	13.96
1965	104.14	16.24	8.25	14.85	10.70	6.31	12.14
1970	79.22	15.44	11.31	15.71	12.44	5.66	14.56
1975	25.42	8.12	5.60	10.09	7.64	3.78	6.36

a. Injury rate $= \dfrac{\text{Deaths and injuries}}{\text{Man-hours} \times 1{,}000{,}000}$

Source: *Rodo tokei yoran* (Labour Statistics).

During 1959, the labour union at the Miike coal mine was very active in the safety movement. Among the 11,711 persons in the union, there was one death, 1,190 serious injuries, and 1,753 slight injuries: thus injury and death were at a 25 per cent level. After the dispute between the union and the company in 1961, there were 10,946 union members and the injury and death rate went up to 38 per cent of the membership, or 4,230 persons.

The death and injury rate was higher for coal and other mineral mining than for any other industry, as is clearly seen from table 5.3.

The most dangerous hazard in any type of mining is that of coal-dust explosions. At the end of the nineteenth and into the beginning of the twentieth century, in confluence with the rapid worldwide growth of the mining sector, mine explosions occurred with ever-increasing frequency and scale in Europe, the United States of America, and Japan. In 1906, the Curie mine in France experienced a massive explosion which killed 1,000 people. From that time on, the mechanisms of mine explosions were clarified and their number decreased. However, in Japan alone there was no reduction in coal-mine explosions. The lessons learned by the international community on this score were not applied in Japan.

As was indicated earlier, safety personnel at the Miike mine had been greatly reduced in number in order that more people could be placed on the production lines. In a word, the mine was being operated with almost no attention to safety and explosion prevention. On 9 November 1963, an explosion occurred in the Mikawa area of the Miike mine, as a result of which 458 persons were killed and 839 suffered from carbon monoxide poisoning. It is clear that this tragedy occurred as a result of the neglect of mining safety.

III. The Worst of the Coal-dust-related Mine Explosions

In relation to coal mines, and also to other large-scale plants like petrochemical complexes, the most important aspects of plant planning and construction are the preparations for possible worst-case accidents. In the case of coal-mining, coal dust represents the greatest hazard.

In the first place, the scale of coal-mine explosions is considerable. Explosions can be sparked by methane gas filling certain areas that are not properly ventilated. Coal-dust explosions, however, present a particular problem, because coal dust is something that is produced at every point in the mining process and accumulates, through the movement of air and the transportation of coal, on the floors, walls, and ceilings of the mine, all the way from the mine entrance to the deepest shafts. Therefore, when a small explosion occurs somewhere in the mine, it is followed by a chain reaction fuelled by the coal dust, and the resulting explosion envelops the entire mine infrastructure.

In the second place, coal-dust explosions are the worst type of explosion because there is a great amount of carbon monoxide produced. As a result of this, many mine workers continue to suffer from the long-term after-effects of carbon monoxide poisoning even if they are lucky enough to be rescued

alive. Methane gas explosions create carbon monoxide when the density of the gas is high, but if there is not much gas it is more often than not dispersed in the air. However, in coal-dust explosions the story is a very different one. Coal dust, being a solid rather than a gas, does not burn completely, and high-density coal-dust clouds can be formed. This prevents adequate air circulation, contributing to the production of carbon monoxide. Even if a coal-dust explosion does not spread throughout the length and breadth of the mine, the resulting carbon monoxide gas does in fact spread in this way and all the workers are poisoned. The Miike mine explosion of 1963 was a good example of this.

There is very little methane gas in the coal seams of the Miike mine. Thus, the possibility of a gas explosion is relatively low and, even if such an explosion came about, the possibility of its initiating a coal-dust explosion is likewise low. Therefore, in the case of the Miike mine, it is clear that some factor caused the dispersal of the coal dust throughout the mine and some ignition source produced the explosion. There are two possible locations where the conditions for starting an explosion are ideal; one is at the seam working face, and the other on the mining slope.

The Miike mine owners were very careless in relation to coal-dust prevention procedures during mining operations. In order to prevent coal-dust explosions it is necessary to keep the dust out of the air by continuously sprinkling the area with water. Alternatively, rock dust, which is incombustible, can be mixed with the coal dust to prevent a chain reaction.

However, on the first mining slope, there were absolutely no preventative measures taken in relation to the problem. According to the testimony of mine workers at the Fukuoka Prosecutor's Office, one to two centimetres of coal dust had accumulated even at the location of the switch-box for the high-voltage system in the mine, and the walls were black with dust. The Fukuoka Mine Safety Department required that coal dust be cleaned away once a week, but, in locations where cleaning was difficult because of the height of the walls and ceiling, no such cleaning had taken place. Thus, the risk of a large dust explosion was inherent in the coal-mining operation, especially when conditions existed that could provide the initial detonation.

IV. The Miike Coal-mine Explosion of 9 November 1963

At 3.12 p.m. on 9 November 1963, a thunderous explosion took place. At the bottom of the first mining level, ten of the four-wheeled carts filled with coal were being hauled to the surface. One of the lower three carts derailed and, because of the tension thereby created, the chain of the third cart broke. At 1,180 metres from the entrance, eight cars began a free-fall run to the bottom of the mine. They ran free for about 360 metres, increasing their speed by 33 metres per second, the momentum breaking archway support frames in the mine. Then all of the carts were derailed and turned over. At this point the explosion took place.

The rapid air displacement caused by the high-speed carts created air cur-

rents which caused the settled coal dust to mix with the surrounding air. It is possible that the friction caused by the carts turning over produced the spark that ignited the coal dust; alternatively, the crashing carts could have damaged the high-voltage cables, and this could have been the ignition point for the explosion. The compression caused by the explosion moved toward the mine entrance, and, 100 metres from the first explosion, a powerful second explosion was created. It has been estimated that the wind created by this second explosion was probably travelling at a rate of 1,000 metres per second. The compression from the second explosion, as it headed toward the bottom of the mine, fortunately did not touch off another explosion, but the carbon monoxide that was created by the two explosions spread throughout the entire mine, creating a disastrous poisoning situation.

At that time the second shift of workers (2 to 10 p.m.) had just started entering the mine, and some of the first-shift workers (6 a.m. to 2 p.m.) were in the process of leaving. Twenty people were killed by the direct effects of the explosions, but 438 died from acute carbon monoxide poisoning, and 839 suffered the after-effects of poisoning. 1,197 of the 1,403 workers in the mine at the time were either killed by the explosions or suffered from carbon monoxide poisoning. There is to date no other coal-mine accident in the world that has produced such a large number of casualties.

Amazingly, the Mitsui Coal Mine Company management had no knowledge of the coal-dust explosion problem. Most labourers believed that coal-dust explosions were caused by methane gas explosions and therefore were not open to ignition from other causes. Since the coal mine contained almost no methane gas it was believed that coal-dust explosions there were an impossibility. This explosion was to dislodge that myth very effectively. If management had shown a greater sense of responsibility toward the potential for coal-dust explosions, appropriate methods of avoiding such disasters would have been taken, cutting down the damage done and minimizing the danger to life and health.

V. Increased Numbers of Gas-poisoning Victims Due to a Lack of Education

The number of deaths and injuries resulting from the explosions was greatly increased by the carbon monoxide problem. In other words, had the carbon monoxide and other poison gases generated by the explosions been isolated in the immediate area, the amount of death and injury could have been kept to a minimum. However, the mining company did not make any efforts to provide for such eventualities. Moreover, it would seem that the company neglected to educate its workers in relation to the potential for gas poisoning. Indeed, it provided misinformation by spreading the "myth" that coal-dust explosions were impossible in the Miike mine.

If the company was unaware of the relationship between dust explosions and the generation of poison gases, then it can only be said that it was irres-

ponsible in the extreme. In most cases the explosion victims were not injured in a physical manner, and many of the corpses recovered from the mine showed no scars or scratches at all, since they were victims of monoxide poisoning. Many of those rescued alive showed very severe symptoms of monoxide poisoning.

The Mitsui Coal Mining Company was aware of these facts but made no attempts to rescue the workers. It indicated that, because of the breakdown of electricity and telephone communications in the mine after the explosions, conditions inside were unclear, and therefore it was too risky to send in rescue crews. One must infer from these statements that management was willing for the 1,400 workers trapped inside the mine to be subjected to the possibility of pervasive monoxide poisoning, with no hope of rescue.

The miners of Miike were angered by the situation, feeling that responsible persons should go immediately into the mine with oxygen tanks. While management was safe from the problem, there were workers in the mine who were at 350- to 450-metre depths and 8 kilometres from the entrance in tunnels. These workers did not know about the explosions and were forced to remain below ground without electricity or telephones. Figure 5.1 is a sectional layout of the mine where the explosion took place. The encircled numbers above the line indicate those who died because of the explosions, and

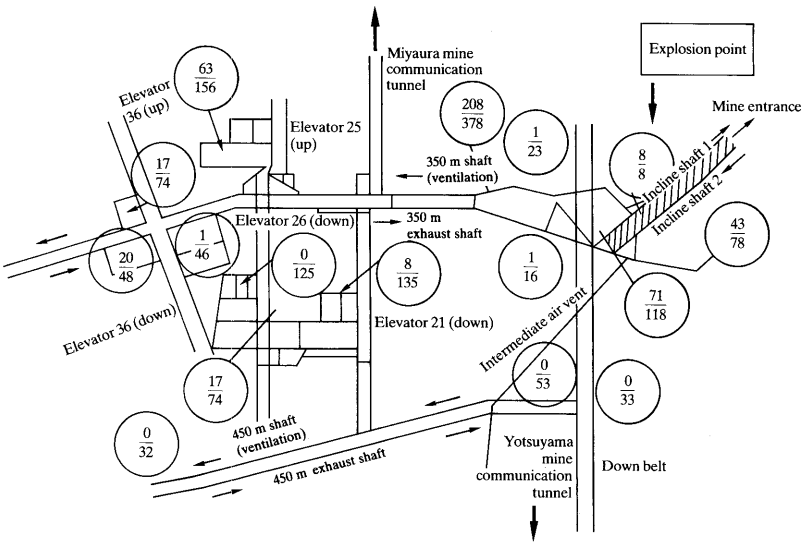

Fig. 5.1. Manning Chart at the Time of Explosion (after Miike Roso, "(s.38.11.g mikawako daibakuhatsu) shozoku rosobetsu hisai basho hyo," *Miike karano hokoku dan 3 shuu*).

Note: Circled figures indicate the number of miners assigned (figure below the line) and the number of deaths (figure above the line) at each station.

those below the line indicate those workers present when the explosions took place.

The workers who knew about the explosion numbered approximately 200, who were located close to the bottom of a neighbouring mine shaft. About 50 who were close to the site of the explosions died as a direct result of the conflagration or from the poison gas generated by the sudden combustion. Another 150 workers heard the explosion at a location where they were waiting for the lift out of the mine. They were told by officers not to move but to wait. These people lost their chance to get away from the destruction and died as a result of monoxide poisoning. Therefore, of the 200 people who knew about the explosion, none of them were able to go and tell the other workers of the seriousness of the problem. Figure 5.1 indicates that at a depth of 450 metres there were 120 workers, none of whom died. At 350 metres more workers died. It is said that at 450 metres there was air circulation from the Mitsui Company's Yotsuyama mine, whereas at the 350-metre level there were no provisions for isolating the poison gases and a ventilation fan worked to increase the rate at which the gas filled the area. The workers who were at this level knew nothing of the explosion and, believing that clean air was being brought into their area, died while on their way to the lift.

Instead of stopping the air-circulation fan, management continued its operation, thereby ensuring a more rapid spread of the poisons. The workers did not know about the gas problem and followed directions to use the passage that was normally used for ventilation; however, this was already filled with poisonous gas.

As a result of these management blunders, 438 persons lost their lives unnecessarily. There were 939 workers saved, but 839 of these suffered from serious carbon monoxide poisoning. Many more might have been saved if the company had taken immediate emergency action or had made preparations beforehand for such eventualities.

VI. Almost Complete Absence of a Security Policy

The rules for rescuing carbon monoxide victims are as follows:

1. If a person looks well and is running out of the problem area, his stage of poisoning is probably well advanced.
2. Poisoning victims should not walk.
3. Poisoning victims should be carried out of the problem area into fresh air for treatment as soon as possible.

These three rules were laid down in 1936 by a medical doctor who had experienced many explosion accidents and had treated many patients at Mitsui Mining's Yamano Mine Hospital. However, the Mitsui Mining Company did not follow these rules.

In the first instance, it took more than two hours after the explosion for a rescue team to be formed with the participation of workers outside the mine and from other mines. When the first crew of 22 workers reached the 350-metre depth it was already 6 p.m., and the poisoning victims had already

been breathing poisons for about three hours. The situation was such that victims could in no way be carried out into the fresh air as soon as possible, since the rescue operations had been considerably delayed.

The Mitsui Mining Company must have been aware that the explosion took place at 3.12 p.m. and that 30 minutes after the explosion the gas victims were already suffering in the mine. Some victims escaped to the entrances to the Yotsuyama and Miyaura mines through connecting tunnels (fig. 5.1), and through this the Mitsui Mining Company headquarters most likely received a report on the poisoning problem. By 4 p.m. at the latest company headquarters had received news of conditions at the three locations (350, 450, and 520 metres) from which workers had been evacuated. In spite of this, rescue teams were sent into the mine two hours after these reports had been received. During this two-hour period, workers trapped in the mine were suffering from gas poisoning and were trying to help each other find safe areas in the darkness. During this same period also, many workers died.

The second problem lay with the fact that the rescue teams made a miscalculation in that they were concerned only with rescuing those who looked most seriously ill. In other words, they carried out only those who had lost consciousness, while those who looked as though they were still able to move or who looked well were required to walk to the mine entrance. Some whose legs below the knees were completely numb still had to walk out of the mine supported by others. The rules for handling carbon monoxide victims are, first of all, those who look most well are most probably very seriously sick, and, secondly, victims should not be allowed to walk. Neither of these rules were followed in any way.

The third problem lay in the fact that those who were monoxide poisoning victims had to help rescue other workers. Those same poisoned workers who looked unharmed went back into the mine as rescue workers. Information gleaned after the accident indicates that 227 workers who were already poisoning victims were employed to help those who could not walk out of the mine. Furthermore, those who had been initially involved in rescue work should not have been made to go back into the mine a second time for further rescue efforts. Table 5.4 compares the number of workers who appeared to be well after coming out of the mine with the small number of those same workers who were able to work afterwards.

There is no other explanation but that the original intention of the company was to use the poison gas victims as rescue crews in order to minimize the labour force losses that would have followed an increase in the number of workers involved in the rescue operations. If the company had been concerned with the health of workers, the instituted measures would have been very different. Rescue crews should have gone into the mine at once and safety provisions should have been made for the rescue workers. But neither of these measures were taken. The company knew that rescue crew members would suffer from monoxide poisoning after entering the mine, and the measures taken to deal with this problem were as poor as those taken to rescue workers from the mine. As a matter of fact, of the 800 people assigned to

Table 5.4. Physical Condition of Miners Engaged in Rescue Work after Suffering Monoxide Poisoning

		Condition of consciousness at the time of mobilization				Post-incident condition				
Location	Number mobilized	Uncon-scious	Regained consciousness prior to mobilization	Dizziness	Relatively normal	Hospi-talized	Resting at home	Working	Notes	
Elevator 21 (down)	91	1	0	12	78	10	61	18	Retired	2
Elevator 26 (up)	105	1	1	13	90	4	67	27	Retired	7
Elevator 36 (up)	31	0	0	3	28	3	12	14	Dead	1
	—			—	—	—	—	—	Unknown	1
Total	227	2	1	28	196	17	140	59		11

Source: Kyoto Kenkyuukai Hen, *Kyuuen dankai ni okeru mitsui kozan no fuho sekinin no tsuikyuu*, p. 58.

rescue work only 323 were brought in from the Mitsui Company's Miyaura and Yotsuyama mines, leaving the rest of the workers at these other mines unaware of and uninvolved in the rescue of 1,400 of their endangered fellow-workers.

As was indicated previously, rescue crews went into the mine without knowing anything about the carbon monoxide problem and without any protection against it and the other poison gases present. Not only that, the company gave no explanation to the rescue crews as to the nature of the accident or the purpose of the rescue mission, and many of the crew members were sent into the mine reluctantly. After reaching the problem area they saw at once that the problem derived from a coal-dust explosion that resulted in poison gases. They were told to hold hands with each other as they went into the rescue area, and were also ordered to bring out first only those who were still breathing. This was done without oxygen tanks and in an area that was filled with poison gas.

Besides the rescue crew members, who had no protection from or knowledge of the nature of the problem and the poisons involved, there was a group of people in white uniforms and with oxygen tanks whose business it was to determine the density of the carbon monoxide using special instruments. But these people were sent into the mine not to help with the rescue operation but to determine the damage done and to replace the telephone lines and other equipment items in order that the mine could be reopened as soon as possible. In contrast to the rescue workers, they were very well equipped, which indicates that management was not serious about rescuing the victims of the explosion. Therefore, because the company showed so little concern for rescue operations and followed none of the rules for saving carbon monoxide poisoning victims, the Mitsui Miike explosion resulted in the largest coal-mine disaster in the history of mining.

VII. Fatal Mistakes Made in the Early Stages of Treatment

Carbon monoxide poisoning victims should be treated on the basis of the following ten principles.

1. Physical examinations should be provided for all workers immediately after they have come out of the mine.
2. Correct information on each of the workers should be gathered so that there are data on location during the accident, the degree of consciousness, the condition of the location where the worker was, and the manner in which the worker escaped.
3. Workers should be reassured and kept quiet.
4. Good ventilation and warmth should be provided.
5. Emergency treatment should be provided for the seriously injured.
6. Immediate action should be taken to give blood transfusions, etc.
7. Individual examinations and treatment should be provided relative to the condition of each patient.

8. Regular observations should be provided for a certain length of time.
9. Appropriate treatment should be provided for mental conditions, especially in the early stages.
10. Families should be given guidance in the care of patients.

Even though the situation after the explosion was confused, the response of the Mitsui Mining Company was far from appropriate as far as these ten principles are concerned. It is not a question as to whether the victims came out of the mine on the same day or were rescued the next day. The point is that 939 people reached the entrance to the mine and, even with differences in the concentration of the carbon monoxide gas, all were carbon monoxide poisoning victims; however, they were not treated as such. The company ordered the hospitalization of only 412 workers and 572 were made to walk home.

The company management made judgements as to who should be hospitalized and who should not on the basis of whether workers could walk or not. They did not ask questions as to the condition of the location from which a worker had come, whether the worker had felt the explosion or not, or how the worker got out of the mine. They paid no attention to workers who were conscious but complained about headaches and nausea, hospitalizing only those who were unconscious or who seemed in a serious condition.

Figure 5.2 shows the conditions of the workers coming out of the mine as criteria for hospitalization. Among the workers who were directed to go home on foot, over 20 per cent were suffering from dizziness or faintness. For those who have any knowledge of carbon monoxide poisoning, it is easily understood that allowing victims to walk home is a very dangerous policy.

Management gave only a shot of vitamins to workers who had lost consciousness and mandarin oranges to those who appeared to be well. Absolutely none of the essential principles for treating carbon monoxide poisoning were maintained. Instead of allowing 530 of the workers to go home immediately, these workers should have been kept still and given appropriate medical treatment, and then the families should have been given guidance on how to handle the effects of monoxide poisoning. If this action had been taken, there would have been fewer cases of worsening health.

After the victims had gone home, they were kept busy meeting family and friends who were overjoyed to discover that they were alive. Furthermore, they also had to attend the funerals of those who had died in the disaster and visit their sick friends in hospital. In the meantime, they drank alcoholic beverages freely, which is the worst possible thing for a monoxide poisoning victim to do. Therefore, the basic rule of keeping quiet was very difficult to maintain. Most of those who went home were at a stage in the poisoning that needs very careful handling.

The monoxide poisoning victims who were hospitalized were also not treated according to the rules pertaining to this type of poisoning. They were not allowed to remain quiet because of the noise and confusion in the hospitals, and thus were subject to constant agitation. The company's hospital had 384 beds, but on the day of the mine explosion there were only 83

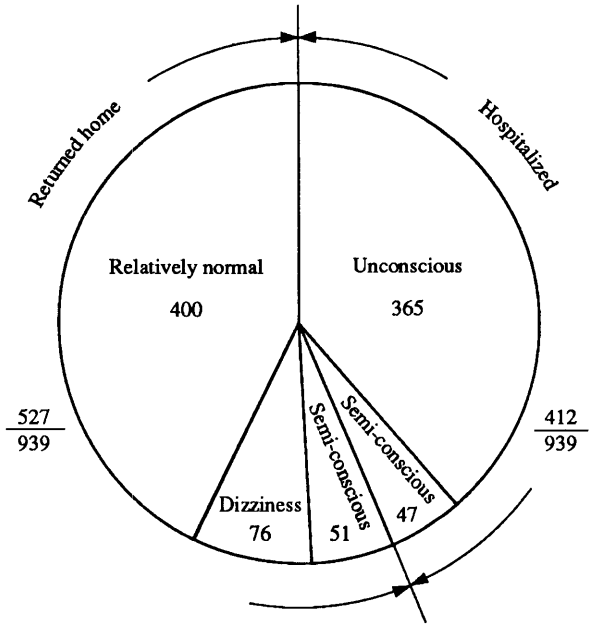

Fig. 5.2. Conditions of Surviving Victims at and following the Time of Rescue (after Kyoto Kenkyuukai Hen, *Kyuuen dankai ni okeru mitsui kozan no fuho sekinin no tsuikyuu*, p. 76).

available. Against this backdrop, a very large number of unconscious patients were carried in and placed in operating rooms, preparation rooms, doctors' examination rooms, and waiting rooms. All of the floor space available was used to house victims, but no more than 361 additional patients could be taken in. The rest of the victims were divided among the other hospitals in the city.

After coming out of their comas, many of the patients would go into wild shouting spasms, start crying, or become violent. Patients would look around the hospital in search of their relatives, and this would cause agitation that resulted in inter-family feuding. The rooms were filled with tobacco smoke. The conditions in the hospitals were of the worst possible kind.

There was no treatment available, no medical examinations, and no medicine. Most of the victims were left to fend for themselves, as the doctors were too busy taking care of the seriously ill patients and disposing of the corpses.

VIII. Carbon Monoxide Poisoning

Carbon monoxide poisoning is a condition in which there is an extreme lack of oxygen in the bloodstream and the body owing to the fact that carbon

monoxide (CO) combines with blood haemoglobin (Hb) more readily than oxygen; with the oxygen replaced by monoxide in the body, the nerve cells of the brain, which need oxygen more than any other cells, begin to degenerate rapidly and within a short time are destroyed. Once the brain cells are dead, even if bodily health returns there are certain functions associated with the brain which never return. This is fully understood in medical circles. In serious cases, the brain is destroyed to the extent that the personality is lost and the patient becomes a living vegetable. In lighter poisoning cases, such as those seen in the Miike mine disaster, patients would regain their health but the poisoning problem would remain dormant until triggered by some change in the balance of forces in the body; they would then suffer convulsions, vomiting, headaches, dizziness, loss of the sense of balance, loss of concentration, loss of memory, and other personality changes. These facts are well known to the medical profession.

From table 5.5 it can be seen that the mine workers had been exposed to the extent that they had a 30 to 40 per cent concentration of CO-Hb in their blood. However, if oxygen levels in the blood are reduced because of carbon monoxide, and patients are then taken from the gas-polluted area and given oxygen, gradually the carbon monoxide in the blood will be replaced by oxygen so long as this oxygen is not being consumed by other forms of bodily activity. This is the most effective way of dealing with monoxide poisoning in its early stages.

Therefore, the most basic rule in mine rescue work is to prohibit walking and other bodily exercise, and this means that very careful attention must be

Table 5.5. Symptoms Resulting from Various Levels of CO-Hb in the Blood

CO-Hb %	Symptoms
0–10	No symptoms except shortness of breath after physical labour
10–20	Slight headache with feelings of pressure toward the front of the head. Shortness of breath with medium exertion
20–30	Bad headaches, feelings of emotional excitement, insecurity, increase in the number of mistakes made, loss of memory, and rapid tiring
30–40	Severe headache, weakness, vomiting, dizziness, loss of sight, confusion
40–50	Great confusion, hallucinations, difficulty in walking, difficulty in breathing, mental stupor
50–60	Unconsciousness, coma, periodic convulsions, difficulty in breathing, weak and fast pulse, pinkness or pallor of face
60–70	Deep coma, loss of sphincter control
70–80	Deep coma, loss of reflexes, weak pulse, shallow and irregular breathing, involuntary bodily movement
Over 80	Breathing stops and death follows rapidly

Source: Koichi Ushio, "Carbon Monoxide Toxicity," in Toyohiko Miura, ed., *New Handbook for Workers' Health*, p. 772.

given to people who look as if they are perfectly healthy. A good supply of fresh air is another basic form of treatment in the early stages of poisoning. In reality, however, no suitable treatment was provided for several hundred workers and these workers suffered various degrees of brain damage because of the misjudgements of mine management.

IX. Unlimited Human Rights Exploitation

The loss of life and health cannot be compensated with money or other material goods. But for those who are victimized by the system, it is necessary to provide living expenses and to guarantee medical treatment. In the case of the Mitsui Miike coal-mine explosion the victims received very poor compensation.

For the 458 deaths, compensation was set at 500,000 yen ($1,400 at an exchange rate of 360 yen to the dollar) or 400,000 yen ($1,120) for condolence money and 100,000 yen ($480) for the funeral costs. The initial proposal by the company was 100,000 yen ($480) per death, but the Miike mine labour union demanded one million yen ($2,800), and the negotiations concluded at the 400,000 yen ($1,120) level.

Up to that time the mining companies had not paid any money to victims' families when a death occurred. This common understanding among mine-owners was brought into question when the Miike mine union demanded compensation. The executives of the union thought that the one million yen ($2,800) demand was rather high, as did the Sohyo (National Organization of Labour Unions), and in this regard the Miike mine workers were heavily criticized even by their own union organizations. This is a reflection of just how cheap life is when it comes to the profit-oriented use of working people.

On the same day as the Miike coal-mine explosion, there was a double train crash that took place at Tsurimi on the Tokaido Line in the Yokohama area. The families of the 161 people who lost their lives in this accident received 5 million yen ($14,000) per person, with a baby being compensated to the tune of 2 million yen ($5,600). Against this background the labourers at the mine would say that if one is to die it is better to die in a plane or train accident than in a coal-mine explosion, simply because the level of compensation is higher. The women who lost their husbands realized that the lives of their men were valued at much less than the baby who died in the double train accident.

Of those killed in the mine accident, 163 were members of the Miike mine labour union, 242 belonged to a second union called Shinro, 25 were members of the Shokuin union and 28 were from a supply of day-labourers. Only the Miike mine union demanded compensation for the families who lost their menfolk. However, even this union was unable to get the company to cover medical expenses for those suffering from carbon monoxide poisoning, as opposed to simple compensation for the family.

Not only those who lost sons and husbands, but also many of the families

of the 839 living victims, had to endure great suffering. Of the latter, 744 victims received notices that they were considered recovered and that their medical payments would end on 26 October 1966, just three years after the incident. Only 26 people were entitled to long-term medical cover, and 59 depended on company decisions as to whether their medical payments would continue or not. Ten people were still missing.

Most of the 744 victims who had been declared "recovered" by the Ministry of Labour were, in fact, still suffering from the after-effects of carbon monoxide poisoning, showing such symptoms as mental disorder or physical weakness. However, the Mitsui Mining Company sent back-to-work orders to these people after their medical treatment had been terminated. Under these circumstances the 744 had to return to work in the mine or be forced to quit their jobs.

Because of the untenability of the situation the Miike labour union returned the back-to-work orders and the medical treatment termination notices with a request that the patient victims be re-examined. Twenty per cent of the Shinro union members and 1 per cent of the office workers' union took the same action. Those who did not return the back-to-work orders were to receive training so that they could begin work again. In this situation there were two possibilities to choose from: to go back to doing the same mining work as before, or to work outside the mine. Work in the mine was very dangerous for the victims of the previous accident; however, work outside the mine, while being less dangerous, only paid half the income of work inside.

Table 5.6 provides some indication of the status of the victims as of 1978. A very small number of the total went back to mining operations, but the num-

Table 5.6. Status of 839 Victims of Carbon Monoxide Poisoning (as of 31 July 1978)

Union	Shinro	Miike	Shokuin	Day labourer	Total
Pensioned	18	16	1	2	37
Victims declared recovered	370	271	77	19	737
Returned to work					
In mine	92	16	20	10	138
Outside	59	91	35	–	185
Died	7	10	3	–	20
Retired	212	154	19	9	394
Missing after retirement	2	–	–	12	14
Retired with pension	13	26	2	–	41
Died while receiving pension	2	4	–	–	6
Died while under observation	2	1	1	–	4
Total	407	318	81	33	839

Source: Miike Kogyosho Shirabe, *S 38 nen CO chuudoku kanjato genkyo shirabe.*

The poster showing the instant of the coal-dust explosion publicized a protest mass rally held at Ohmuta City Hall 17 years after the disaster.

ber of day-labourers who went back was greater. The Miike mine union was at loggerheads with the company over the question of preventing a recurrence of the same kind of accident in the mine, insisting that people made sick by the explosion should not have to return to the work they did before. They insisted that their work should be safe, even if they had to accept lowered payments, and on this basis the union was determined to find other avenues for compensation.

Most of the day-labourers who had been accident victims went back to the mine. In this situation they were placed in the most difficult and dangerous circumstances. Those who had carbon monoxide poisoning symptoms walked unsteadily, and had great difficulty keeping their balance. As a result, more people were injured. These victims did not have the power of concentration needed to operate the machines, and some of them were killed or badly injured in accidents with machines.

The Miike mine labour union demanded a re-examination of the level of compensation provided by the company, but this demand was rejected by management. Finally medical expenses were provided for 737 victims of the disaster, as the company came to recognize the needs of these people. The Miike mine labour union continued their efforts to get the company to provide safe working conditions outside the mine for the victims, with the idea of rehabilitating them. In 1971, such working places were provided, and these were called the Manza and Shinko shops. At the Manza shop there was mainly flower-growing, tree nurseries, farming, and bamboo work; this was designed to employ the badly affected victims of the mine explosion. The Shinko shop was for those less affected and offered work repairing mine equipment. These programmes were established in order to protect the human rights of these workers as well as to provide meaningful employment so as to maintain pride and emotional stability.

X. Filing of Suits for Damage Compensation

Compensation annuity payments were made to victims who had been so severely mentally damaged by the carbon monoxide as to be unable to recognize their own wives. In many cases the victims would offer violence to their family after they had returned home from the hospital, and it became increasingly clear that they were often unable to control their own emotions. In these situations, wives were required to earn the income to support the family.

These personality changes were seen among the less obviously affected victims, and for family members this radical alteration in the sum and substance of personality was difficult to deal with in the extreme. On 6 November 1972, two families who included four monoxide poisoning victims took their cases to court and demanded compensation from the Mitsui Coal Mining Company. The demand was for 20 million yen ($84,000) per family and 30 million yen ($126,000) per victim. By April 1973, a total of four families and eight victims had taken their cases to court.

On 11 May 1973, 161 families who had lost sons and husbands in the explosion, along with another 259 victims of the accident, had also entered the court struggle to seek damage compensation. The court struggle of the 259 victims is supported by the Miike coal-mine labour union, while the family cases are being fought by the particular families involved. The demands made by the 259 victims are 34,500,000 yen ($151,800) per death, 23,000,000 yen ($101,000) for patients requiring long-term hospitalization, and 11,500,000 yen ($50,600) for each of the other victims.

Ten years before, the demands were at the one million yen ($2,800) level for each death, and even this small amount was criticized by the labour unions as being too much. But with the changes in the social climate, these demands were more in line with damage claims made in relation to other forms of death and destruction emanating from technological civilization.

The court battles being waged in the civil courts are oriented toward the extraction of compensation funds from the company, but the real goal of the struggle is to get the company to change the conditions in the mine that lead to coal-dust explosions. The court proceedings provide a forum through which it has been demonstrated that the mine management completely ignored the safety of the workers, to the extent that conditions in the mine were dangerous in the extreme. A coal-dust explosion was the inevitable result of this neglect and irresponsibility.

Another purpose of the court struggle is to clarify the rights of mine workers in general. Their lives were treated as being of less value than that of a baby lost in a train accident. The families of the Miike mine workers, after their long struggle, have come to realize that the labour union movement should have as a priority the protection of the lives and health of labouring people.

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