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Department of Lands, Forests and Mines:
Ontario

Bulletin No. 9

THE BUREAU OF MINES

REPORT

ON THE

Mining Accidents in Ontario
in 1911

By E. T. CORKILL,
Chief Inspector of Mines

PRINTED BY ORDER OF
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TO THE HONOURABLE W. H. HEARST,
Minister of Lands, Forests and Mines, Ontario.

SIR,—I beg to submit herewith a report by Mr. E. T. Corkill on Mining Accidents in Ontario in 1911.

This report is presented in advance of the regular Report of the Bureau of Mines (Vol. XXI.), which, when published, will deal with the several branches of the mineral industry, the object being to publish Mr. Corkill's report in handy form, at as early a date as possible, for distribution among managers and others in charge of mining operations.

Mr. Corkill's report deals with accidents in metallurgical works as well as with those in or about mines and quarries. The report analyzes the causes of the accidents, and gives very complete tables of the causes and the results. Recommendations are made in this, as in former reports, concerning the prevention, in so far as possible, of accidents in the future.

I have the honour to be, Sir,

Your obedient servant,

THOS. W. GIBSON,
Deputy Minister of Mines.

Bureau of Mines,
Department of Lands, Forests and Mines,
Toronto, 24th February, 1912.

MINING ACCIDENTS IN 1911

By E. T. CORKILL, Chief Inspector of Mines.

During the year 1911 in and about the mines regulated by the Mining Act of Ontario there were 33 fatal accidents which caused the death of 36 men. The fatalities below ground numbered 33, and above ground 3. Altogether, at the mines, metallurgical works and quarries regulated by the Mining Act there were 45 fatal accidents, causing the death of 49 men, an increase of 1 over the number killed in 1910. The accidents at metallurgical works and quarries are separated in this report from the accidents at the mines, and are set out in tables following those for the mine accidents. In former reports of the Bureau of Mines all the accidents have been included in the one table, and this should be taken into consideration in comparing the accidents for 1911 with those of previous years.

The total number of serious accidents in the mines of Ontario reported to the Bureau of Mines was 111, resulting in 36 men killed and 86 injured. Of these accidents 82 occurred below ground and 29 above ground. The fatal accidents took place in mines operated by 21 different companies.

At the metallurgical works there were 33 accidents which caused the death of 9 and serious injuries to 25 men.

The number of accidents therefore at mines and works regulated by the Mining Act of Ontario is 144, causing the death of 49 men and serious injuries to 111 men. Of the men seriously injured, 60 received their injuries below ground and 51 above ground.

A "serious" accident is not defined by statute, but is here taken to mean an accident by which a man is incapacitated for work for more than seven days.

Investigation and report were made in 30 out of the 33 fatal accidents in the mines, in 6 out of 9 fatal accidents at the metallurgical works, and in all the quarry accidents. In accordance with the requirements of the Mining Act, inquests were held on most of the men killed; and to assist in bringing out the facts, were attended by either the Inspector or the writer. In a few instances, through the lack of knowledge on the part of the Coroner as to the law requiring an inquest, none was held. An investigation in such cases was made by the Inspector or the writer, and the evidence of witnesses taken under oath.

Analysis of Fatalities

By months the 36 fatalities occurred as follows:—January, 6; February, 1; March, 6; April, 0; May, 3; June, 4; July, 0; August, 0; September, 3; October, 2; November, 4; December, 7; total—36.

A comparison of the causes of the fatalities at the mines for 1910 and 1911 is as follows:—

	1910. Per cent.	1911. Per cent.
Falls of ground.....	19.0	5.5
Shaft accidents.....	21.6	22.2
Explosives.....	27.0	44.5
Miscellaneous (underground).....	8.1	19.5
Surface.....	24.3	8.3

These figures show a marked decrease in the accidents from falls of ground and in surface accidents, but a large increase in those caused by explosives.

There were employed at the producing and non-producing mines during 1911 approximately 9,423 men. At these mines 36 men were killed, which is equivalent to 3.82 per 1,000 men employed.

Table of Fatal Accidents in Mines, Metallurgical Works and Quarries, 1900 to 1911.

	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	Total
Persons killed in producing and non-producing mines	17	13	10	7	7	9	11	22	47	49	48	49	289
Persons employed in producing mines	3,330	4,135	4,426	3,499	3,475	4,415	5,017	6,305	7,435	8,505	10,862	12,543	73,847
Persons employed in non-producing mines (estimated)..	850	550	450	400	400	500	750	1,140	1,750	2,000	2,000	2,000	12,590
Total persons employed.....	3,980	4,685	4,876	3,899	3,875	4,915	5,767	7,345	9,185	10,505	12,862	14,543	86,437
Fatal accidents per 1,000 employed.....	4.27	2.77	2.05	1.79	1.80	1.83	1.90	2.99	5.11	4.66	3.73	3.37	3.34

Note—Figures for 1911 are subject to revision.

The following classification distributes the responsibility for the cause of the fatalities at the mines.

1. Fatalities due to danger inherent to the work itself..... 10 or 27.8 per cent
2. " arising out of defects in the mine workings 10 or 27.8 "
3. " due to fault of fellow workmen 2 or 5.5 "
4. " due to fault of injured person 14 or 38.9 "

The specific occupation in the mine of the men who were killed, and their nationality, are shown in the following table:—

Occupation	English Speaking	Polander <small>1900-1911</small>	Finlander	Italian	French	Hungarian	Austrian	Total
Drill runner	5	1	7	.....	1	.....	1	15
Trammer.....	.....	4	.....	.....	.....	1	.....	5
Drill helper.....	.....	2	2	1	1	.....	.....	6
Bucket or Cage tender.....	.....	1	.....	1	.....	.....	.....	2
Laborer	1	.....	.....	1	.....	.....	.....	2
Shift boss	1	.....	.....	1	.....	.....	.....	2
Powderman	1	.....	.....	.....	.....	.....	1	2
Deckman	1	.....	.....	.....	.....	.....	.....	1
Hammerman.....	.....	.....	.....	.....	1	.....	.....	1
Total.....	9	8	9	4	3	1	2	36

The ages of the men killed at the mines were as follows:—

17 to 20	21 to 25	26 to 30	31 to 35	36 to 40	41 to 45	56 to 60	Unknown	Total
2	15	5	7	4	1	1	1	36

Cause and Place of Fatalities in Mines

The following schedule shows the cause and place of the fatalities in 1911 compared with 1910:—

Below ground:	1911.	1910.
Falls of ground	2	7
Shaft accidents:—		
Falling from bucket	3	
Falling down shaft	3	
Objects falling down shaft	1	
Falling down shaft due to staging giving way	1	
	— 8	8
Explosive Accidents:—		
Premature explosion while loading or lighting holes	5	
Drilling into bottom of old or missed holes	3	
Explosion of box of dynamite while preparing charges..	3	
Asphyxiation from gases from explosives	3	
Picking or putting bar into old hole containing explosive.	2	
	— 16	10
Miscellaneous accidents:—		
Falling down chute	3	
Struck by steel, etc., falling down stope or from staging.	3	
Falling down stope	1	
	— 7	3
Above ground:—		
Blowing up of thawing house	2	
	— 3	9
Total	36	37

Cause and Place of Non-Fatal Accidents at Mines

The following schedule shows the cause and place of the non-fatal accidents in 1911 at the mines, and the number injured:—

Underground:—		
Falls of ground		4
Shaft accidents:—		
Cage accidents	4	
Bucket accidents	1	
Falling part way down shaft	3	
Objects falling down shaft	1	
	—	9
Explosives:—		
Drilling into old or missed holes	8	
Picking or putting bar into old hole	1	
Premature explosion	1	
	—	10
Miscellaneous accidents:—		
Falling down stopes, raises, winzes, chutes or man-ways	8	
Jammed by cars, skips or buckets	8	
Scaling	4	
Falling from staging	3	

Foreign material in eyes	2	
Fall of rock or ore from chutes	8	
Burned	2	
Flying rock	1	
Rock rolling down muck pile	1	
	—	37
Surface:—		
Falling from elevated places	11	
Caught by machinery	3	
Falling objects	4	
Explosives	2	
Caving of trench on rock pile	2	
Foreign material in eye	2	
Coupling cars	1	
Burned	1	
	—	26
		—
Total		86

The table giving the details of the above accidents will be found following the table of fatal accidents.

Mining Regulations and How Observed

The table giving the details of the above accidents will be found following the table managers and men. By referring to the classification distributing the responsibility for the cause of the fatalities it is seen that 72.2 per cent. were due to carelessness, neglect or foolhardiness on the part either of the mine management or the workmen themselves. This does not mean that all these fatalities were due to non-observance of the mining regulations; in fact only about 25 per cent. were due to direct infringement of the Mining Act. The other 47 per cent. were due mainly to dangerous mining practice, foolhardy methods or carelessness in performing the work.

Negligence has been shown by mine managers in carrying out the regulations in respect of the following:—

1. The erection and maintenance of approved thawing houses.
2. The installation of safety cross-heads.
3. The proper and efficient scaling of the roof and walls of working stopes, shafts, drifts and cross-cuts.
4. The forbidding of riding in buckets and skips.
5. Maintaining auxiliary ladders in the shaft while sinking.
6. The proper ventilation of underground workings.
7. The enforcement of the provisions regarding the blasting of missed holes, and forbidding drilling into bottoms of holes that have been blasted.

Failure to strictly observe the regulations provided for the above matters has been a prolific cause of accident.

The provisions that are most frequently broken by the workmen have reference to:—

1. Proper care in the handling of explosives.
2. Drilling into missed or cut-off holes.
3. Drilling into the bottom of old holes that have been blasted.
4. The tamping of holes after charging.
5. Riding in buckets or skips.
6. Keeping in position guard-rails around the shaft openings.
7. Proper scaling of walls and roof of working places.

These provisions are sometimes wilfully disobeyed by the workmen, and at other times broken through ignorance, carelessness and neglect. The violation of each is responsible every year for serious and often fatal accidents. The Mining Act makes provision for the reporting of careless acts to the Inspector of Mines by mine managers. Very few cases are ever reported, however, until an accident occurs, when the manager is only too anxious to place the blame on the workman. The proper time for reporting these careless practices is the first time a man is found guilty. When not reported, the manager assumes the responsibility along with the workman.

A dangerous practice that has resulted in serious and fatal accidents is the placing of men to work over other workmen in such a position that a careless act on the part of the workmen above imperils the safety of the men working below. This practice is most dangerous and should never be allowed under any circumstances.

The following notes briefly describe the fatal accidents at the mines from the several causes, and the methods that should be adopted for their prevention.

Falls of Ground

There was a marked decrease in the number of fatalities from this cause, there being only two men killed in 1911 compared with 7 in 1910. One of these men was killed by deliberately walking under a piece of ground that another man was endeavoring to take down, and when directly under it the piece fell. The other man was killed by being struck by a piece of ore falling a distance of about 30 feet. The roof of the stope had been examined and scaled on the day of the accident, but the scaling must have been poorly done. It is necessary to emphasize again the need of constant watchfulness on the part of the shift bosses over the scaling operations of the workmen. Only unceasing vigilance will prevent accidents from this cause.

Shaft Accidents

There were eight fatalities in shafts in 1911, being the same number as in 1910. The accidents, however, resulted from different causes.

Three men lost their lives through falling from buckets. Of these, two were the result of an infringement of the Mining Act.

One man in a Porcupine mine was riding up in the bucket when in some manner he fell from it and was killed. This was a direct violation of the Act, and a prosecution would have followed, but the Porcupine fire occurred just at the time, and action, under the circumstances, was deferred.

Another man was riding down in the bucket when the cross-head stuck, and after the bucket had descended about 120 feet, the cross-head dropped and the man fell to the bottom of the shaft. The company were prosecuted for maintaining a cross-head in the shaft not in accordance with the Mining Act.

Another man fell from the bucket, due to its upsetting with him. It was not ascertained how the lug holding the bucket upright became unfastened. To guard against this type of accident it would be safer to have a fastener on each side of the bucket for holding it in position.

Three men were killed by falling with car down the shaft. In two of the cases the man pushed the car into the shaft entrance while the cage or door was not in proper position. If the guard-rails around the shaft entrance were always kept in proper position, except when actually taking the car off or putting it on the cage, such accidents would not occur. The third man was apparently leaning over the shaft to see if the cage was coming and lost his balance, pulling the car into the shaft after him. This was another accident that would have been prevented if the guard had been kept in its proper position.

One man was killed by being struck by a rock falling from some place in the shaft. A round of holes was blasted in a shaft about 100 feet distant from the shaft in which this man was at work. Apparently the concussion from the blast caused the rock to fall either from the wall or from the timbers on which it may have been lodged. Blasting should not be done in such close proximity to where men are working. Another met his death through a staging on which he was working giving way and causing him to fall to the bottom of the shaft. This accident was due to carelessness in putting up the staging.

All the above shaft accidents were preventible if the Mining Act had been obeyed and proper care had been exercised in carrying out the work.

There were no fatal cage accidents in 1911. The type of cage used in the mines of Ontario is, however, not satisfactory, and accidents are liable to occur, due to the sides of the cage being so open. It is advisable that the type of cage outlined in the last report of the Bureau of Mines should be adopted. Another safeguard for shafts is the automatic gate, which can only be opened while the cage is at the level.

The safety cross-head illustrated in the Twentieth Report of the Bureau of Mines has been found to work satisfactorily wherever installed, and has no doubt reduced the number of accidents due to the sticking in the shaft of the old style of cross-head.

Explosive Accidents

There were 16 fatalities resulting from the use of explosives underground and 2 on the surface, a total of 18 men killed. There were 36 men in all killed at the mines, so that explosives were responsible for 50 per cent. of the fatalities. In 1910 there were 10 men killed by explosives at the mines, or 27 per cent. of the total number killed. It is, therefore, evident that there has been an increase of nearly 100 per cent. in the fatalities from this cause.

This condition is a matter for regret and also for censure when, on an analysis of the fatalities, we find that at least half of the accidents was the result of carelessness. In the greater number of accidents from explosives there are generally only two factors. The first is the condition of the explosive, and the second the care with which it is handled. The first cause is one over which the Inspector of Mines has but little control, and has no facilities for acquiring such control. There has never been in Canada any legislation dealing with the inspection of explosives, which is a matter coming within the jurisdiction of the Federal government. At present anyone who has a substance that will explode may sell it, if he can get a buyer. Before the quality of the explosive is proven accidents may result. It is not only the small dealer who needs inspection, but also the large producers. In the competition for making sales and the desire for large profits, the grade of the explosive may not be kept up to the standard. Improper mixing, improper proportion of ingredients, improper packing, all tend to render the explosive unsafe and to increase the accident rate. Old explosives that have been in storage for more than a year are sometimes shipped into the less accessible camps in the winter time, and have to be used by the mining companies during the summer, as no others can be obtained. When an accident occurs now from an explosive, there is no way by which this explosive may be thoroughly tested, to ascertain wherein the fault lies.

Careless handling of explosives is a factor for the prevention of which the Mining Act contains certain regulations. The mine foremen and the mine managers are the men most closely in touch with this phase. They are supposed to see that the men use care in all their work pertaining to mining. The large accident list goes to show that they do not at all times fulfil their duties satisfactorily. It would seem that a number of men are employed in Ontario, handling explosives, who are totally unfitted for their work. A man may be discharged from one mine for incompetence and carelessness, but he obtains work at an adjoining mine and goes on as before. A careless workman should never be allowed near explosives, to say nothing of handling them.

Of the 5 men who lost their lives through premature explosions, 3 were killed while lighting a round of holes entirely untamped. The explosion was caused by fire from the lighted fuse igniting the exposed explosive in the hole. Accidents from this cause are preventible, and are due to the negligence and carelessness of the men, and also of their superiors, who should take precautions to see that the men do this work properly. The other two men were killed while loading holes. No explanation of the cause of the accidents could be given. It is possible that they were due to the explosive used being inferior.

Three men were killed as a result of drilling into old or missed holes. Two of these men purposely drilled into the bottoms of old holes, that had been blasted but did not break properly, with the idea of deepening the holes a little. There was some explosive left in the bottom of the hole, and as a result the men were killed. This practice is strictly forbidden by the Mining Act, and is one of the most dangerous and foolhardy of the careless practices indulged in around the mines. The other man was killed as a result of drilling into a missed hole. The missed hole was a lifting hole in a cross-cut, and could easily have been found if the drill runner had been careful. He started the new hole about 10 inches from the collar of the missed hole, and at an angle to it. After drilling a couple of feet he drilled into the missed hole, causing an explosion which killed his helper.

Three men were killed in one accident through the premature explosion of a box of dynamite that had been brought into the mine preparatory to loading a round of holes in the shaft. No cause for this explosion was found, as all the witnesses were killed, and it was impossible to ascertain just what the men were doing when the explosion occurred.

Three men lost their lives through being overcome with the gases emanating from the discharge of a round of explosives. Two of these men were shift bosses who went to the part of the mine where blasting had been done, and where none of the men were working. They were overcome by the gases and were dead when found. In connection with these two accidents it was found that the gases had been allowed to remain for some hours without turning on the air to blow them out. It is essential to allow the air to blow into the working face after a round has been blasted, whether the men are to return to work in that place the next shift or not. After these gases cool and settle they are much more deadly than immediately after the blasting. The other man was asphyxiated in a winze. Owing to there not being sufficient air to hoist the men from the winze after the round of holes had been lighted, one of them was unable to reach a place of safety, and, after the blasting, was overcome by the gases and was dead before he could be taken out. The mining company and the foreman in this case were prosecuted under the Mining Act by the Inspector of Mines for not maintaining an auxiliary ladder in the winze. The former was fined \$100 and costs, and the latter \$50 and costs.

Two other men lost their lives through striking explosives with a bar. In one case the explosive was in a cut-off hole, and in the other it was either an old hole containing an explosive or some explosive in the muck. In the first case it was impossible to understand why the workman did not see the cut-off hole, and it was due to lack of proper inspection that the accident occurred. In the second case the man was using his bar in a pile of muck cleaning off a bench in order to set up the drill. It is therefore quite probable that even a close inspection would not have disclosed the presence of the explosive.

Thawing House Explosions

Two thawing houses blew up during the year, causing in each case the death of the powder-man. In one case it was proved that the powder-man had a lighted candle in

the thawing house, which no doubt caused the explosion. In the other case it was impossible to find any cause for the explosion. The thawing house was, when inspected two months before the explosion, in very good condition, with a satisfactory heating arrangement.

It is necessary to emphasize the following points that should be observed in the construction of a safe and efficient thawing house:—

1. It should be built of such materials that in case of an explosion, there will be the smallest number of pieces to be projected any distance.

2. The heating arrangements should be by means of hot water or steam circulated in pipes.

3. These heating pipes must be so arranged that no explosives can be placed or accidentally fall on them.

4. The racks should be so placed that they are some distance away from the heating pipes.

5. These racks should be thoroughly cleaned and washed at least once a month.

6. The house should be constructed with an ante-room opening into the room in which the explosives are thawed. This will guard against a sudden change in the temperature of the thawing room.

7. The thawing room should be maintained at as uniform a temperature as possible and a thermometer kept therein.

8. A proper ventilator which can be opened or closed should be built in the roof of the house.

9. A separate building should be constructed in which to prepare the exploders.

10. No caps or fuse should be kept in the thawing house.

11. A wooden or copper wedge should be used for opening the boxes of explosives.

12. A competent man should be placed in charge of the thawing house, and no other person allowed to enter it.

13. A proper system of lighting should be installed, and a naked light never allowed near the building.

14. The powder-man should never carry matches or tobacco while on duty.

Miscellaneous Accidents

There were 7 men killed in miscellaneous accidents underground. Of these 6 were killed in stopes and 1 in a drift.

Three of the fatalities were the result of men falling into the ore chutes from the stopes. The mouths of chutes in stopes are hard to keep guarded at all times, owing to the blasting. They should, however, be covered with timbers at all times except when actually in use. In one of the cases the ore had hung up in the chute, and the man was up on it trying to drive an iron pipe through in order to start the ore running. It loosened unexpectedly, and the workman was drawn down by the ore and smothered.

Three other men lost their lives through being struck by objects falling from above them. One of these men was struck by a hammer-drill which fell from the staging, due to the breaking of the steel. The staging was about 6 feet above the floor of the drift, and the man killed was standing about 8 feet from the end of the staging.

The other two men were killed by being struck with drill-steel. In one case, and probably in the other, the steel fell down the stope from where the machine men were working. These machine men were set to work on a bench of the underhand stope, which was in such a position relative to the trammer that anything falling from the bench would in all probability strike the trammers, unless they heard it coming and ran to a place of safety. Such a practice is very dangerous, and should never be followed. One man slipped while taking down the tripod for the drill and fell to the bench, 12 feet below, and was killed.

Surface Accidents

Three men were killed on the surface about the mines. Of these, two were killed by the blowing up of thawing houses. This matter has been discussed under a previous heading. The other man was at work piling up pieces of shafting. One end of the shafting was on a brace about 2 feet above the ground. The man slipped and fell with his head under the shafting; at the same time the brace gave way, allowing the shafting to fall on the man, killing him instantly.

Prosecutions

The following cases of prosecution for infringement of the Mining Act were undertaken by the Inspector of Mines:—

1. One company were fined \$100 and costs for a violation of sec. 164, rule 23, of the Mining Act, in not maintaining an auxiliary ladder in the winze while sinking was in progress.
2. The foreman of the above company was fined \$50 and costs for the same offence as No. 1.
3. The manager of a second company was fined \$100 and costs for a violation of sec. 164, rule 19, of the Mining Act, in not maintaining guard rails at the collar of the shaft.
4. A third company were fined \$100 and costs for a violation of sec. 164, rule 24a, of the Mining Act, in not maintaining a safety cross-head so constructed that it cannot stick in the shaft without also stopping the bucket.

Porcupine Fire

A most disastrous fire swept over the Porcupine camp in July, causing the death of 71 persons and the loss of thousands of dollars in camp buildings and equipment. The largest loss of life occurred in the West Dome shaft, where some 34 persons took refuge from the fire. This shaft was about 80 feet in depth, with no auxiliary exit. The timbers took fire at the collar of the shaft, and were burned to a depth of about 30 feet. As a result all in the shaft were suffocated. Several other persons were suffocated in the Dome shaft, where they had taken refuge. This is a startling example of the danger of erecting buildings too near the shaft when there is but one entrance to the mine. It also proves the necessity for securing an auxiliary exit as soon as possible. The location for magazines for explosives in a wooded country is also a difficult problem on account of the danger from fire. Frequently sufficient care is not taken in cleaning up around these magazines, or in their method of construction.

There was no marked outbreak of disease among the miners during the year. A little typhoid was present in nearly all the northern Ontario camps. The question of providing sanitary camps and a proper water supply does not receive sufficient attention until an outbreak of disease compels the companies to look after it. The overcrowding of the bunk houses in our newer camps is also to be condemned. There is not sufficient care shown in providing a properly equipped dry house, in which the men working underground can change their clothing when coming off shift. This is specially necessary in Ontario in the winter time on account of the very cold climate.

Mine Hospitals

The mine hospital at Cobalt has done efficient work throughout the year. Mr. Tom R. Jones has again been elected president of the board. All the operating mining companies in the Cobalt camp are now subscribers to the hospital.

The Canadian Copper Company's hospital at Copper Cliff has also done good service throughout the year in taking care of the sick and injured employees of the company. It is to be very much regretted that this fine hospital was destroyed by fire on January 17th, 1912.

There is much need of a hospital at Porcupine. The Dome Mines, Limited, have built and equipped a hospital for the care of their own employees. None of the other mines there have as yet provided any place where their sick or injured workmen may be cared for in the camp. It is necessary to send them to some hospital outside,—a journey which, in the case of badly injured or very sick persons, lessens their chance of recovery. A concentrated effort should be made at once for the erection of a mine hospital.

The Ventilation of Mines

The Mining Act of Ontario requires that "an adequate amount of ventilation shall be constantly produced, so that the shafts, adits, tunnels, winzes, raises, sumps, levels, stopes, cross-cuts, underground stables and working places of the mine and the travelling places to and from such working places shall be in a fit state for working and passing therein." But little attempt has been made in the mines of Ontario to adopt any form of artificial ventilation except compressed air, exhausted in the workings by the drills or blown between the shifts, for cleaning the workings of fumes resulting from blasting. It has been found necessary in coal mines to adopt complete systems of artificial ventilation owing to the presence in the mines of noxious gases. In recent years, however, owing to the extent to which some of the metalliferous mines have been worked, artificial ventilation has been adopted with most advantageous results.

The Transvaal Mining Regulations require the following standard of ventilation:—

I. In every metalliferous mine sufficient air shall be provided and such other arrangements made, that in any sample of air taken under normal working conditions from any part of the mine, not less than one hour after blasting:—

- (a) The proportion of carbon dioxide shall not, as regards any mine within the Witwatersrand area, exceed 20 volumes per 10,000 of air=0.2 per cent.
- (b) The proportion of carbon monoxide shall not exceed 1 volume per 10,000 of air =0.01 per cent.

No practically determinable amount of the oxides of nitrogen (NO and NO₂) shall be present.

At the East Rand mines ventilating fans were installed at the Angelo and Cason shafts, producing respectively 300,000 and 350,000 cu. ft. of air per minute. The effect on the air of the mine was marked. Before the installation of the fans an average analysis gave:—

CO ₂	0.493 per cent.
CO	0.012 "

but after the installation of the fans:—

CO ₂	0.127 per cent.
CO	0.005 "

The total cost of the equipment was about \$125,000. Mr. Penlerick, the manager of the mines, states: "The cost is insignificant compared to the valuable results obtained, and under the circumstances some system of artificial ventilation should be adopted in practically every mine on the Rand."

A complete artificial ventilating system by means of fans has been in use at the Comstock mines, Nevada, for some years, and has proved most effective.

Another system that has proven beneficial is confining all the blasting operations to one shift.

There are many types of ventilating fans in use, the majority being fairly efficient. The installation and operation cost of any of these at the mines in Ontario, where the capacity required would not be great, would be comparatively small, and would, I believe, be insignificant compared with the valuable results obtained.

General

A number of men every year receive injuries which can only be classified as serious. Through some constitutional weakness or neglect, other complications occasionally arise, resulting in death. There were three such cases in 1911, which have not been placed in the fatality list, though the injured man ultimately died.

Mr. V. Gravelle, employed as table helper at the Northern Customs Concentrator, had his back broken on April 27th, through falling a distance of about 12 feet to the floor. He was engaged in shifting a belt when in some way he lost his balance and fell backwards. Gravelle was cared for at the Cobalt Mines Hospital until Sept. 24th, when he was removed to his home. A few days after he contracted pleurisy and died as a result, on Oct. 14th. There is little doubt that the injury left him in a weakened condition, so that he was an easy victim to the disease.

Mr. C. Rinker was employed as foreman at the blast furnace of the Algoma Steel Company. He was burned about the neck and hands on Sept. 22nd, through the sudden dumping of a ladle of cinders on which he was working. On Oct. 15th he returned to work, these wounds being apparently quite healed, and worked three shifts. He then consulted a doctor, who told him that his heart was very much affected, and advised him to refrain from excitement or heavy work of any kind. He died on Oct. 29th. At the inquest the result of the post-mortem was given, and it was shown that heart disease was most marked, and that this was the primary cause of death, although it may have been hastened by the shock of the burns.

Martin Urenovizh, a laborer, employed at the blast furnace of the Algoma Steel Company, on May 5th, got a piece of hot metal in his eye. He was taken to the hospital, and, after examination and treatment, the doctor recommended that the eye be removed. Urenovizh refused to allow the operation to be performed, and as a result both eyes became badly infected, and his general health suffered. Finally he permitted the operation but the infection had become too widely spread, and he died on June 2nd. The attending physician states that there is no doubt that the man's life would have been saved had he permitted the operation to be performed at the proper time.

The following table summarizes the fatal accidents in or about the mines, giving the name of the person killed, nature of injury, cause of accident, etc.:

Table of Fatal Accidents

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
1	Feb. 13.	Beaver	Beaver Con. Mines Co..	George Rannick, powderman
2	Dec. 6.	Buffalo	Buffalo Mines, Ltd. ...	Wilfred Rheame, drill helper
3	Dec. 23.	Silver Leaf	Crown Reserve	J. Graham, deckman
4	Dec. 26.	Calcite Lake	Calcite Lake Mg. Co. ...	Sigmund Terdk, mucker
5	Dec. 29.	do	do	Thos. Whitten, drill runner
6	Jan. 14.	Crean Hill	Canadian Copper Co. ...	Fred. Turcrack, trammer
7	Mar. 2.	Creighton	do	Roman Katyn, drill helper
8	June 28.	Crean Hill	do	Maetro Lazoveritch, trammer
9	Sept. 18	Creighton	do	George Wuori, drill helper
10	Oct. 11.	do	do	Ignot Vasilkoski, trammer
11	Nov. 30.	do	do	Nichola Hluchaniuk, trammer.....
12	Dec. 8.	do	do	Patrick Sammon, powderman
13	Nov. 25.	Station Grounds.	Cobalt Station Grounds Mining Company ...	Michael Nace, laborer
14	Dec. 15.	Townsite	Cobalt Townsite Mg. Co.	W. Mandley, drill runner
15	Oct. 27.	Dome	Dome Mines, Ltd.	Otto Nemine, drill helper
16	Dec. 9.	do	do	Marvin Sommers, laborer
17	Sept. 29.	Drummond	Drummond Mines, Ltd.	John Kalaska, drill runner
18	June 26.	Foley O'Brien ...	Foley O'Brien Mg. Co..	Grovanni Gentile, drill helper ...
19	Jan. 26.	Helen	Lake Superior Power Co	{ John Maki, drill runner
				{ Oscar Mantynen, drill runner ..
				{ John Thompson, drill runner ..
20	May 22.	do	Lake Superior Power Co.	Louis Niemi, drill runner
21	Sept. 18.	do	Lake Superior Power Co.	Vertillio Spina, bucket tender
22	Mar. 27.	Hollinger	Hollinger Gold Mines, Ltd.	{ Fred. Dupuis, drill runner
				{ Joseph Knash, drill helper
23	June 16.	McKinley Darragh	McKinley-Darragh-Sav- age Mines, Ltd.	Jas. Graves, drill runner
24	Mar. 8.	Millerett	Millerett Silver Mg. Co.	John S. Kennedy, shift boss
25	Jan. 29.	Garson	Mond Nickel Co.	Otto Heinanen, drill runner
26	May 10.	do	do	John Riley, drill runner
27	June 22.	Nipissing	Nipissing Mining Co. ...	Victor Leina, drill runner
28	Nov. 6.	do	do	Peter Milensnic, drill runner
29	Jan. 19.	Norrington	R. W. Norrington	Albert Brunette, hammerman
30	Mar. 19.	Northern Pyrites	Northern Pyrites Mg. Co.	Geo. Cavazza, shift boss
31	May 23.	Nova Scotia	Nova Scotia Silver Co- balt Mining Co.	Aleck Sznitzer, cage tender
32	Nov. 9.	Richardson	Kingston Feldspar and Mining Co.	Michael O'Connor, drill runner ...
33	Mar. 16.	Temiskaming ...	Temiskaming Mg. Co..	Albert Sullivan, drill runner
				Total

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
1	Jan. 20.	Atikokan	Atikokan Iron Co.	Wm. Bortis, drill runner
2	May 7.	Bailey	Bailey Cobalt Mines, Ltd	Henry Briscoe, drill runner
3	May 9.	Beaver	Beaver Con. Mines, Ltd.	L. Saino, drill runner
4	Aug. 14.	do	do	H. Feener, carpenter
5	Sept. 18.	do	do	H. Russell, machinist
6	Dec. 5.	do	do	J. McGinnis, laborer

In or About the Mines.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
.....	1	Back and right side injured.	Explosion in thawing house.
1	Skull fractured	Explosion resulting from drilling into bottom of missed hole.
1	Skull smashed and body very badly mangled	Fell down shaft.
1	Skull fractured	Fell from bucket.
1	Fracture of skull	Fell down shaft, due to staging giving way.
1	do	Fell down chute.
1	Whole body badly lacerated.	Struck bar into missed hole or some unexploded powder in muck.
1	Fracture of skull	Struck by rock, falling from back of stope.
1	do	Struck powder in cut-off hole while scaling.
1	do	Struck by falling rock or piece of steel.
1	do	Struck by falling steel.
.....	1	Blown to pieces	Thawing house blew up.
1	Fracture of bone of skull	Fell from bucket down shaft.
1	Body greatly lacerated	Premature explosion due to fuse spitting into dynamite in untamped hole.
1	Fracture of skull	Struck by piece of falling rock in shaft.
.....	1	Neck broken	Fall of shafting.
1	Head badly injured	Explosion of dynamite while loading hole.
1	Fracture of skull	Fell from bucket.
1	Body badly lacerated	} Explosion of box of dynamite.
1	do	
1	Broken back	} Premature explosion in untamped hole.
1	Body lacerated	
1	Instantly killed	Fall of ore on which deceased was standing.
1	Fracture of skull	Fell with car of muck down shaft.
1	Body lacerated	} Premature explosion in untamped hole.
1	Fracture of skull	
1	Asphyxiation	Struck by hammer drill falling off staging.
1	Fracture of skull	Overcome by fumes from dynamite explosion.
1	Chest crushed	Fell down stope into chute.
1	Fracture of skull	Fall of piece of rock.
1	Chest badly crushed	Drilled into hole containing explosive.
1	Killed instantly	Explosion while loading hole.
1	Asphyxiation	Drilled into hole containing explosive.
1	Fracture of base of skull	Overcome by gas.
1	Fracture of skull	Fell down shaft.
1	Asphyxiation	Fell with drill down stope.
1	Asphyxiation	Unable to escape from winze after lighting round of holes.
33	3		

Accidents in or About Mines.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
1	.....	Shoulder bruised	Was sand blasting when apparently fuse spit into exposed dynamite.
1	.....	Body slightly burned	Clothing caught fire from candle.
1	.....	Right leg broken	Fell ten feet with staging.
.....	1	Ankle sprained	Fell from roof of power house.
.....	1	Right wrist broken	Fell from top of boiler.
.....	1	Body bruised	Fell from scaffold while engaged on mill construction.

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
7	Dec. 18.	Beaver	Beaver Con. Mines, Ltd.	J. Olska, deckman
8	May 15.	Buffalo	Buffalo Mines, Ltd.	D. Desjardins, carpenter
9	Aug. 7.	do	do	H. Slack carpenter
10	Sept. 21.	do	do	W. Cooper, carpenter
11	Oct. 2.	do	do	H. Harrison, laborer
12	Nov. 1.	Buffalo Mill	do	Joseph Doyle, spare shift boss
13	Dec. 6.	Buffalo	do	{ Bert Reid, drill runner
				{ Isadore Marion, drill runner
				{ A. Hunton, drill helper
14	Aug. 17.	Badger	Badger Mines, Ltd.	E. O. Evans, laborer
15	Feb. 7.	Creighton	Canadian Copper Co.	Ilia Puscas, trammer
16	Mar. 2.	do	do	Mike Baylick, drill runner
17	Apr. 27.	do	do	Yak Maki, drill runner
18	May 10.	do	do	Guiseppi Fera, trammer
19	May 5.	do	do	E. M. Medlen, time keeper
20	June 19.	do	do	Carmino Fisico, trammer
21	Aug. 25.	do	do	Walakin Manilan, block-hole driller
22	Sept. 4.	do	do	{ Yalmar Virta, drill runner
				{ Emil Maka, drill helper
				{ Aisak Laari, drill helper
23	Oct. 26.	do	do	Adolphe Kinos, scaler
24	Feb. 7.	City of Cobalt ..	City of Cobalt Mg. Co.	A. Cain, drill runner
25	Mar. 7.	do	do	T. W. Bradley, drill runner
26	June 1.	Cobalt Lake	Cobalt Lake Mining Co.	W. Biledo, carpenter
27	June 15.	Town Site	Cobalt Townsite Mg. Co.	S. Donaldson, drillman
28	Oct. 27.	Coniagas	Coniagas Mines, Ltd.	Henry Barkel, timberman
29	Nov. 9.	do	do	Thos. Hayward, drill helper
30	May 19.	Crown Reserve ..	Crown Reserve Mg. Co.	Edward Edwards, pump man
31	Oct. 14.	Dobie	Dobie Mines, Ltd.	Chas. Teare, mucker
32	Dec. 24.	do	do	E. J. Gaudet, drill helper
33	Oct. 25.	Dome	Dome Mines, Ltd.	J. Glasskowski, mucker
34	Sept. 15.	Gillies	John Gillies	Jas. Cowdy, laborer
35	Oct. 10.	Hollinger	Hollinger Gold Mines, Ltd.	John Karpela, trammer
36	Sept. 12.	Hargraves	Hargraves Silver Mines, Ltd.	{ Thos. Troughten, drill man
				{ Isaac Wilson, drill helper
37	Mar. 10.	Richardson	Kingston Feldspar and Mining Co.	John P. Cooper, trammer
38	May 4.	Kerr Lake	Kerr Lake Mg. Co.	G. Burgin, carpenter
39	June 17.	do	do	Herbert Day, powderman
40	Feb. 18.	La Rose	La Rose Mines, Ltd.	George Buhajczuk, drill runner
41	Apr. 27.	Lawson	do	M. Bajurink, nipper
42	Aug. 3.	do	do	John Szmyrk, mucker

Accidents in or About Mines—Continued.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
.....	1	Fractured rib	Fell from trestle while dumping car.
.....	1	Concussion and shock	Fell from staging thirty feet.
.....	1	Index finger taken off at first joint	Came in contact with knives of buzz planer.
.....	1	Fingers of left hand cut	Came in contact with knives of buzz planer.
.....	1	Hip bruised	Fell off wagon.
.....	1	Arm badly lacerated	Clothing caught an exposed set screw on shaft.
1	.....	Face injured	Explosion resulting from drilling into miss- ed hole. (See Fatal Accident.)
1	.....	do	
1	.....	do	
.....	1	Fracture of clavicle	Fell from porch of boarding house.
1	.....	Head cut	Struck on head by falling rock.
1	.....	Cuts on body	Bar struck missed hole or some unexploded dynamite in muck.
1	.....	Arm injured	Struck by piece of rock while scaling.
1	.....	Lost sight of one eye	Struck by piece of rock while sledging.
1	.....	Internal injuries	Struck by tram-car.
.....	1	Scalp wound	Struck by skip while passing under skip track on surface.
1	.....	Lost sight of both eyes	Drilled into missed hole.
1	.....	Face cut and eyes injured	Drilled into old hole.
1	.....	Lost sight of both eyes	
1	.....	Legs cut	
1	.....	Head injured	Knocked off bench and down stope by fall- ing rock.
1	.....	Bruised.	Falling rock struck plank on which injured stood and precipitated him 10 feet.
1	.....	Fractured rib & scalp wound	Fell about ten feet while timbering shaft.
.....	1	Concussion of brain and body bruised	Fell 43 feet while working on mill construc- tion.
1	.....	Slight concussion of brain ..	Fall of rock broke staging and precipitated injured 50 feet down stope.
1	.....	Fracture of shoulder blade..	Fell from ladder 6 feet.
1	.....	Scalp wound and bruises to body	Pile of rock on which injured stood gave way and carried him down chute.
1	.....	Bruised	Fell down winze 30 feet.
1	.....	Scalp wound and cuts on head ..	Loaded bucket caught on timber and upset.
1	.....	Leg bruised	Fell 15 feet in man-way of shaft.
1	.....	Fracture of scapula and scalp wound	Struck by drill which fell down shaft. Struck by falling bucket.
.....	1	Arm broken	
1	.....	Both arms had to be ampu- tated	Overcome with gas and fell on candle.
1	.....	Scalp wound	Struck by fall of rock while timbering raise.
1	.....	Leg broken	
1	.....	Fractured thigh	
.....	1	Leg broken	Struck by rock hurled by blast.
1	.....	Body bruised	Fall of jig.
1	.....	Right leg broken	Fell down winze 48 feet.
1	.....	Hip and shoulder bruised ..	While scaling, rock struck him on leg.
1	.....	Left arm broken	While taking steel up with him on cage piece caught on timber.
1	.....	Left arm broken	Left arm caught in timber while riding up on cage.

Table of Serious Non-Fatal

No.	Date.	Mine.	Owner.	Name and Occupation of Injured.
43	Aug. 28.	La Rose	La Rose Mines, Ltd. ..	George Robitaille, drill runner ...
44	Sept. 11.	do	do	D. Tkacruz, mucker
45	Sept. 13.	do	do	John Smith, mucker
46	Feb. 9.	Helen	Lake Superior Power Co.	Dan Vezmar, trammer
47	Feb. 15.	do	do	John De Diana, drill runner
48	Feb. 23.	do	do	L. Pegararo, drill runner
49	Mar. 24.	do	do	G. Murma, trammer
50	Mar. 29.	do	do	M. German, trammer
51	Apr. 7.	do	do	Valentine Trombine, trammer
52	Apr. 19.	do	do	Harry Lipka, trammer
53	Apr. 26.	do	do	John Matijczuk, trammer
54	Apr. 19.	do	do	Mike De Sacco, drill runner
55	May 27.	do	do	G. Zanetti, trammer
56	May 31.	do	do	V. Monaco, chute tender
57	May 31.	do	do	G. DelFavero, laborer
58	June 1.	do	do	A. Alamaki, blacksmith
59	June 22.	do	do	J. Uba, trammer
60	June 24.	do	do	G. Svaluto, trammer
61	June 24.	do	do	A. Budzinski, trammer
62	July 26.	do	do	Geo. DelFerro
63	Aug. 21.	do	do	T. Wolosianka, crusherman
64	Oct. 7.	do	do	Victor Muki, drill runner
65	Oct. 10.	do	do	Thomas Dudgeon, machinist
66	Oct. 30.	do	do	J. Marastini, trammer
67	Nov. 13.	do	do	L. Svanson, chute tender
68	Dec. 14.	do	do	A. Chatinaca, skip tender
69	June 22.	Magpie	do	{ Victor Salo, hand driller
				{ Anti Hankela, hand driller
70	Apr. 4.	Burgess	Manufacturers' Corun- dum Co., Ltd.	Neil McAlpine, trammer
71	Sept. 22.	T. R. 57	Reginald Merriman ...	W. Wilkinson, laborer
72	Sept. 20.	McIntyre	McIntyre Porcupine Mines, Ltd.	Robt. Richardson, drill helper
73	May 29.	Nipissing	Nipissing Mg. Co., Ltd..	J. Robin, drill runner
74	Jan. 19.	Norrington	R. W. Norrington	Fred. Carroll, hand driller
75	Apr. 27.	Mill	Northern Customs Con- centrators, Ltd.	V. Gravelle, table helper
76	Nov. 28.	Quarry	Port Credit Brick Co..	H. Proinor, signal man
77	Oct. 6.	Swastika	Swastika Mining Co. ..	John England, drill runner
78	Jan. 25.	Temiskaming ...	Temiskaming Mg. Co..	William Allan, drill runner
79	Dec. 23.	do	do	E. Dunnigan, timberman
80	July 24.	Henderson	S. Wellington	John Reeves, trammer
				Total

Accidents in or About Mines—Continued.

Below Ground	Above Ground	Nature of Injury.	Cause of Accident.
1	.....	Shoulder and hip bruised ...	While scaling from staging, rock fell breaking staging causing him to fall.
1	.....	Big toe broken	Rock rolled from top of muck pile on it.
1	.....	Arm bruised	Jammed arm between car and rock.
1	.....	Large toe broken	Bucket fell on toe.
1	.....	Bones in foot broken	Rock fell on foot.
1	.....	Sprained ankle	Struck by piece of ore, falling from chute.
1	.....	Right hand bruised	Hand caught between car and truck.
1	.....	Left hand bruised	do
1	.....	Large toe broken	Rock fell from chute on foot.
1	.....	Sprained ankle	Cage dropped 25 feet due to friction slipping.
1	.....	Finger broken	Caught finger between car and truck.
1	.....	Leg broken	Cage dropped 25 feet due to friction slipping.
1	.....	Finger broken	Piece of ore fell from chute on hand.
.....	1	Tear in scrotum	Fell from ore car.
.....	1	Ankle injured	Struck on ankle by piece of iron.
.....	1	Face burned	Face burned in blacksmith shop.
1	.....	Foot injured	Piece of ore fell from chute on foot.
1	.....	do	Piece of ore fell from chute on foot.
1	.....	Nail torn off thumb	Piece of ore fell from chute on hand.
1	.....	Fingers cut	Hand jammed between car and rock.
.....	1	Eye injured, sight impaired.	While sledging ore, piece flew, striking him in eye.
1	.....	Eye injured	Got piece of ore in eye.
.....	1	do	Got piece of emery from wheel in eye.
1	.....	Finger crushed	Piece of ore fell on hand.
.....	1	Finger broken	Hand caught while coupling car.
1	.....	Finger crushed	Caught finger between car and skip.
.....	1	Right hand blown off	While loading hole explosion occurred. Were working on sewer trench.
.....	1	Eye and nose injured }	
.....	1	Three ribs broken, also collar bone	Went under frozen pile of broken rock which fell on him.
.....	1	Two ribs broken	Side of trench caved in on him.
1	.....	Head badly lacerated	Became gassed, and fell from ladder.
1	.....	Wounds and bruises on head and body	Fell twenty feet down raise.
1	.....	Leg broken	Drilled into hole containing explosives.
.....	1	Back broken (died on Oct. 14th of pleurisy)	Trying to shift belt guard, when he lost his balance and fell 14 feet.
.....	1	Injury to spine	Fell a distance of twenty feet from a rock bin.
1	.....	Scalp wounds	Fell from ladder down man-way.
1	.....	Fracture of the skull	Fell down a stope a distance of about 80 feet.
1	.....	Leg broken	Fell about 12 feet, due to breaking of sprag holding platform on which he was working.
1	.....	Arm broken	While scaling, rock falling hit bar, jamming Reeves against wall.
60	26		

Accidents at Metallurgical Works

Inspection of the metallurgical works of Ontario forms part of the duty of the Inspector of Mines. These works include blast furnaces, copper-nickel smelters and converter plants, and silver smelters. At such works during 1911 there were nine fatalities.

Blast Furnaces

At blast furnaces two men were killed in 1911. One of these men was run over by a yard engine. A number of non-fatal accidents also occurred from this cause. It is almost essential in blast furnace yards, where there is so much noise at all times from the furnace, to have all engines, trolley cars, etc., provided with an efficient alarm bell or gong, which can be rung continuously when moving where workmen are employed. Another man was killed by being struck on the head with a brick falling from a platform inside the furnace when bricklayers were at work re-lining it. Care should be taken in such cases to see that men are never put to work immediately below other workmen unless proper protection is afforded them. A number of serious accidents occur annually at the blast furnaces due to burns received. These burns are either caused by hot cinders, or by explosion of the molten iron due to its coming in contact with water. Proper care should be taken to see that the workmen working in proximity to this hot material are properly clothed to afford protection. More use should be made of shields, asbestos mitts, etc.

Copper-Nickel Smelters and Converter Plants

Six men lost their lives while employed at copper-nickel smelters and converter plants. One of the men was crushed between cars in the converter building. The same care should be taken in having the engines equipped with alarm bell or gong as for engines around blast furnaces. Another man while working on the top of the converter patching up a hole with fire-clay, was struck by a piece of matte and slag, falling a distance of about two feet, from the converter hood. The man was struck on the back of the head, and the blow caused a fracture of the base of the skull, which resulted in his death.

Another man received fatal injuries by the fall of the converter hood, due to the breaking of the bar on which the hood was hinged. The pieces of the broken bar were subjected to a microscopic examination, and the bar was found to be composed of what is known as "bushelled" wrought iron. This class of iron bar is not suited to such a use on account of its lack of uniformity of texture.

A third workman while engaged in repairing, fell through the roof of the converter building, and was killed. The tiles with which the roof was covered had deteriorated, owing to the action of the gases. They were being replaced by new ones and the man was engaged at this work. He inadvertently stepped off the plank on which he was standing, which broke, allowing him to fall to the floor.

A fourth man was killed by an explosion in the settler, which must have been caused by the metal coming in contact with a leakage from one of the coolers. The man was burned to death by the molten matte.

An engineer in a smelter power-house was electrocuted through coming in contact with a high pressure wire. Sufficient care is not always taken in transformer rooms to have the high voltage wires removed from easy access. No matter how experienced a workman may be, he is apt at times to forget the necessity of constant care in the neighborhood of electric wires carrying high voltage. Such wires should, therefore, be so installed that a workman could not come in contact with them without some effort of his own. This would eliminate nearly all the accidental shocks.

Silver Smelters

Silver smelters furnished one fatality during the year. This occurred while the employee was engaged on construction work outside of the building. While on a scaffold six feet above the ground the scaffold fell, and the man had his back broken and died a few days later.

There were employed at the metallurgical works during 1911, approximately 3,718 men. At these works nine men were killed, which is equivalent to 2.42 per 1,000 men employed.

The following table shows the number and nationality of the men killed at the various classes of work at the metallurgical plants:

	English Speaking	Polander	Finlander	Italian	Total
Engineer	1	....	....	....	1
Tuyere puncher .....	....	1	....	....	1
Tapper	1	....	....	....	1
Converter puncher .....	....	....	....	1	1
Carpenter's helper .....	....	....	1	....	1
Converter puncher's helper .....	....	1	....	....	1
Laborer .....	....	....	....	2	2
Carpenter	1	....	....	....	1
Totals	3	2	1	3	9

Cause and Place of Fatalities at Metallurgical Works

	1911	1910.
BLAST FURNACES:		
Run over by yard engine	1	
Struck by falling brick while re-lining furnace	1	
	—	2 3
COPPER-NICKEL SMELTERS AND CONVERTER PLANTS:		
Explosion in settler	1	
Crushed between cars	1	
Struck by piece of slag falling from hood	1	
Falling through roof while engaged in repair work.....	1	
Falling of converter hood through breaking of bar.....	1	
Electrocuted in power-house	1	
	—	6 4
SILVER SMELTERS:		
Falling from scaffold	1	
	—	1 3
Total	9	10

Cause and Place of Non-Fatal Accidents at Metallurgical Works

BLAST FURNACES:		
Falling from elevated places	2	
Falling objects	1	
Run down by cars	5	
Burned	8	
Part of body coming forcibly in contact with object	2	
	—	18
COPPER-NICKEL SMELTERS AND CONVERTER PLANTS:		
Falling	1	
Objects falling	1	
Struck by skip	1	
	—	3
SILVER SMELTERS:		
Falling from elevated places	2	
Caught by machinery	2	
	—	4
Total		25

A table follows giving particulars of the fatalities at the metallurgical works; also one with regard to the serious non-fatal accidents.

Table of Fatal Accidents at

No.	Date.	Works.	Owner.	Name and Occupation of Injured.
1	July 15.	Blast furnace....	Algoma Steel Co.	Geraldi Vinzinzi, laborer
2	Jan. 16.	Converter plant..	Canadian Copper Co. ..	P. Pologseyk, tuyere puncher
3	Mar. 27.	Smelter.....	do ..	Arthur Jennings, tapper
4	Apr. 5.	Converter plant..	do ..	Valpini Attilio, converter puncher.
5	Aug. 15.	do	do ..	John Mieska, carpenter's helper ...
6	Oct. 28.	do	do ..	Ignotz Chiptomi, converter puncher's helper
7	Apr. 6.	Smelter.....	Coniagas Reduction Co.	Wm. Allen, carpenter
8	Aug. 4.	Power house....	Mond Nickel Co.	Chas. Longfellow, engineer
9	Oct. 10.	Blast furnace....	Steel Co. of Canada ..	David FeDuzzi, laborer
				Total.....

Table of Serious Non-Fatal Accidents

No.	Date.	Works.	Owner.	Name and Occupation of Injured.
1	May 1.	Blast furnace....	Algoma Steel Co.	Raffael Gullo, laborer
2	May 5.	do	do	Martin Urenovizh, laborer
3	Aug. 28.	do	do	Fabio Finani, laborer
4	Sept. 7.	do	do	John Murray, stove tender
5	Sept. 8.	do	do	Peter Brown, labor foreman
6	Sept. 16.	do	do	Campanelli Dellino, laborer
7	Sept. 17.	do	do	{ G. Guglielmine, laborer
8	Sept. 21.	do	do	{ Pietro Artusi, laborer
9	Sept. 22.	do	do	Roy Goatbe, brakeman
				Chas. B. Rinker, night foreman ...
10	Oct. 24.	do	do	Valenti Michell, yard foreman
11	Oct. 30.	do	do	John Clarke, hoistman
12	Nov. 5.	do	do	John Sirkoe, keeper
13	Nov. 21.	do	do	Hector Gagnier, oller
14	Nov. 23.	do	do	John Cutigras, laborer
15	Dec. 16.	do	do	Arthur Strand, blower
16	Mar. 25.	Converter plant..	Canadian Copper Co....	Baoli Bacco, laborer
17	June 19.	do	do	Fachimi Getulia, liner
18	Feb. 6.	Smelter.....	Coniagas Reduct'n W'ks	Chas. Welham, laborer
19	Nov. 8.	do	do	Walter Rapsey, carpenter
20	Dec. 13.	do	do	Herbert Putnam, carpenter
21	Dec. 19.	do	do	Henry Carter, ass't foreman
22	June 26.	do	Mond Nickel Co.	John Smith, laborer
23	Jan. 22.	Blast furnace....	The Steel Co. of Canada	Tomaso Silenze, laborer
24	Nov. 6.	do	do	Benj. Carter, pitman
				Total.....

Metallurgical Works.

No. Killed.	Nature of Injury.	Cause of Accident.
1	Body seriously cut up	Run over by engine in blas furnace yard.
1	Thigh and abdomen crushed.	Caught between drawbars of two cars.
1	Burned to death	Explosion of settler, due to leakage in cooler.
1	Fracture of base of skull ..	Struck by piece of slag falling from hood.
1	Injury to spinal column ...	While repairing roof, stepped on defective tile and fell to floor below.
1	Pelvic bone fractured, which punctured bladder	Bar supporting converter hood broke, precipitating injured to floor.
1	Fracture of spinal column.	Fall of scaffold.
1	Electrocuted	Came in contact with wire carrying 15,000 volts.
1	Deep gash at base of skull...	Struck by falling rock while relining furnace.
9		

at Metallurgical Works.

No. Injured	Nature of Injury.	Cause of Accident.
1	Foot cut off below instep....	Run over by train.
1	Right eye burned	Struck by hot cinder in right eye; refused proper treatment, and died 2nd June, from septic embolus.
1	Leg injured	Bucket dropped on leg.
1	Right foot scalded	Escape of hot water from furnace pipe.
1	Knee injured	Struck knee on small pipe.
1	Legs burned	Cinder ladle burst.
1	Neck burned	Furnace slipped, throwing out hot coke.
1	Neck burned	
1	Left leg injured	Thrown off while standing on foot-board of engine.
1	Hand and neck burned	Ladle of cinders dumped unexpectedly. Rinker returned to work Oct. 15, and worked three days. He went home and consulted a doctor, who told him he had heart disease. He died from arrested circulation, on Oct. 29th, 1911.
1	Heel crushed	Struck by cinder ladle, kicked in on cinder track by locomotive.
1	Ankle sprained and head cut.	Overcome by escaping gas while replacing hook on charging can, and fell to top of furnace.
1	Left leg and both hands burned	Struck by molten iron ejected from furnace while drilling clay from iron hole.
1	Toes on right foot crushed ..	Scale car ran over foot.
1	Leg cut	Man struck by passing car.
1	Face burned and pitted	While changing tuyere, iron ran out, struck water and exploded.
1	Injured internally	Prying on bar, when it suddenly gave way.
1	Leg injured	Leg crushed by drop ball on converter.
1	Right knee injured	Fell from ladder 15 feet.
1	Fracture of tip of right elbow.	Fell from ladder.
1	Index finger of left hand cut off	Hand came in contact with jointer knives.
1	Left leg and two ribs broken, other bruises	While oiling main shaft, clothing became wrapped around it.
1	Scalp wound, bruised back..	Struck by skip.
1	Knee and chin cut	Fell 15 feet.
1	Several ribs broken	Fell over iron box while running away to avoid being burned.
25		

Accidents at Quarries

Under this heading are classified the accidents that occur in all kinds of stone quarries and in excavations at brick yards.

Four fatalities occurred at stone quarries during 1911, all of which were on the surface and not in the quarry. Two men were killed while engaged in shovelling fine rock from a car, owing to another car striking it. Both cars were on a siding which had a heavy grade. A loaded car was being let down from the bins, but the brakes did not work properly and the man lost control of it. It struck the car in which the two men were working, throwing them on the track where they were crushed beneath the wheels.

Another workman was crushed between two locomotives. One locomotive was off the track and the other one was being used to push it back on the track. A tie was placed between the bumpers of the two engines to accomplish this. The tie slipped and the man was caught and crushed to death.

An engineer in the power-house at one of the quarries was killed through being struck with a piece of rock projected by a blast in the quarry. There is not sufficient care taken at quarries to have proper shelters for the men wherein they may take refuge while a blast is being discharged.

There is also much negligence shown around quarries in the handling of explosives. The management in a number of cases seems to be either ignorant or careless in the matter of providing proper magazines and thawing houses. It is just as essential to have a proper thawing house, if only a few sticks of explosive are being thawed, as if it were an equal number of cases. There is also negligence shown in the reporting of accidents. All accidents that are likely to incapacitate a workman should be reported within 24 hours after the time of occurrence.

Table of Fatal

No.	Date.	Quarry.	Owner.	Name and Occupation of Injured.
1	Mar. 28	Doolittle & Wilcox	Doolittle & Wilcox, Ltd.	{ Medio Toro, laborer
2	Sept. 22	do	do	{ Louis Pace, laborer
				Ernest Finlay, crusher man
3	April 19	Hagersville.....	Hagersville Contracting Company	George Arthur Howard, engineer..
				Total.....

Cause and Place of Fatalities at Quarries		1911.	1910.
In quarry		0	1
On surface:—			
Run over by car on siding	2		
Crushed between two locomotives	1		
Struck by flying rock	1		
		—	—
		4	0
Total		4	1

The following table shows the occupation and nationality of men killed at quarries:

Occupation.	Canadian.	Italian.	Total,
Labourers		2	2
Engineer	1		1
Crusherman	1		1
Total	2	2	4

There were employed at the quarries during 1911, approximately 1,402 men. At these quarries four men were killed, which is equivalent to 2.85 per 1,000 men employed. The following table sets out the particulars of fatal accidents in the quarries :

Accidents at Quarries

In Quarry	On Surface	Nature of Injury.	Cause of Accident.
.....	1	Body crushed	} Unloading a car on siding, when it was struck by another coming down grade. While assisting to replace locomotive on track, crushed between it and another locomotive.
.....	1	Legs crushed	
.....	1	Body crushed	
.....	1	Fracture of skull	Struck by piece of rock hurled by blast.
.....	4		

