

In Chapter 9, the regulations make provision for the safe handling and use of explosives, once more the distinction being drawn between the various classes of mine.

It is of particular importance to note the wording of a large number of the regulations in these two chapters, which are, 'no person shall, and no person shall cause or permit . . .'. As was stated in *R v Player* 1927 TPD 585⁽¹⁾ where a portion of the judgment in *R v Webb* 1911 TPD 280 can be taken to mean that where a regulation states a person must not cause or permit an act to be done, then it means that a specific instruction on this point must be given prohibiting the act, and the person who has this responsibility must ensure to a reasonable degree that his prohibition will be obeyed. Each case must be considered on its merits, but it is no excuse to have issued a prohibition and then to walk away, particularly when there is a doubt as to whether that prohibition will be obeyed.

The ganger or miner in charge of a working place, whether underground or in opencast workings, has a great responsibility placed on his shoulders to ensure that work is carried out safely. Coupled to the ganger or miner's responsibility is the responsibility of the mine overseer and manager to ensure that the requirements of the regulations are observed and complied with by the ganger or miner.

The ganger or miner, as well as any of the other employees of the company, are engaged in work which is considered to be furthering the interests of the company and, as such, renders the company liable to prosecution for any contravention of these regulations under the provisions of s 332 of the Criminal Procedure Act 51 of 1977.

CHAPTER 10

VENTILATION, GASES AND DUST

A. The following provisions shall apply to works and the surface of every mine—

10.1.1 No person shall enter or remain in, or cause or permit any other person to enter or remain in, any place if the air contains harmful smoke, gas, fumes or dust perceptible by sight, smell or other senses unless such person or such other person is wearing effective apparatus, approved for the purpose by the Director-General, to prevent the inhalation of such dust, gas, fumes or dust.

10.1.2 No person shall work, or cause or permit any other person to work, in any place where dust, noxious fumes or harmful gases in the air at any time exceed concentrations as may from time to time be specified by the Director-General unless such person or such other person is wearing effective apparatus, approved for the purpose by the Director-General, to prevent the inhalation of such dust, noxious fumes or gases.

Furthermore, exposure of persons to ionizing radiation shall be controlled in such a manner that radiation doses to exposed persons are in compliance with a system of dose limitation laid down by the Director-General, in consultation with the Atomic Energy Corporation of South Africa, Limited.

10.2.1 Where rock, ore, coal or other mineral compound is reduced in size, screened, moved, handled or otherwise subjected to any process which may produce dust—

- (a) the liberation of dust into the atmosphere shall be effectively controlled by the use of water or other dust allaying agent or by a dust extraction system, and
- (b) every building in which any of these processes takes place shall be adequately ventilated and the floor and other surfaces as well as the machinery, shall be regularly cleaned so as to prevent an accumulation of dust.

10.2.2 Any bag, box, carton, drum or other similar container for transporting crushed or screened rock, ore, coal or other mineral or mineral compound shall be of such material and so closed that, as far as practicable, no harmful amount of dust can escape therefrom during handling or transport.

The provisions of regulations 10.1.1, 10.1.2, 10.2.1 and 10.2.2 are very important, and particularly in small crushing plants on surface it is found that no provision has been made in the design and construction of the plant for compliance with these requirements.

It should also be remembered that it is one of the duties of an engineer or competent person in charge of machinery to ensure that the plant and machinery complies with the requirements for safety and health. There is, of course, the ultimate responsibility of the manager in terms of s 31(1)(a)(ii) of the Act.

10.2.3 Every drill-sharpening shop or other workshop necessary and incidental to the sharpening of drills and any other workshop, building or shed where harmful dust may be produced, shall be kept clean and adequately ventilated and the liberation of dust into the atmosphere prevented, so far as is practicable, by the use of water or other dust allaying agent or by a dust extraction system.

10.2.4 Subject to regulation 10.1.1, compressed air shall not be used—

- (a) in any way likely to cause—
 - (i) dissemination of a harmful amount of dust; or
 - (ii) injury to any person; or
- (b) to clean the body of a person or clothes worn by him.

10.2.5 Every drill-sharpening shop or other workshop necessary and incidental to the sharpening of drills shall be provided with a concrete floor which shall be kept clean.

10.2.6 Where sand blasting is done, protective breathing equipment, approved by the Director-General, shall be worn by every person exposed or likely to be exposed to the dust.

10.3.1 Where noxious or flammable fumes or gases are likely to be present in quantities sufficient to endanger the safety or health of any person, or where a deficiency of oxygen is likely to develop, adequate ventilation shall be provided or other effective means taken to safeguard persons.

10.3.2 Before any person enters or causes or permits any other person to enter any pit, tank, vessel or chamber likely to contain noxious or flammable fumes or gases or an atmosphere deficient in oxygen, such pit, tank, vessel or chamber shall be examined by a person, properly trained to conduct such an examination, and no person shall enter or remain or cause or permit any other person to enter or remain in any such pit, tank, vessel or chamber unless it is safe to work therein.

10.3.3 Any fire or furnace in a room or building shall be provided with an efficient flue discharging to the outside atmosphere.

10.3.4 No person other than a competent person or a person under the immediate supervision of a competent person shall handle or move, or cause or permit any other person to handle or move, any compound of cyanide which is likely to produce harmful dust or noxious or flammable gases, unless such compound is in a closed airtight and watertight container.

10.3.5 When any compound of cyanide is likely to produce harmful dust or noxious or flammable gases is dissolved by a process not remotely controlled, every person who may be exposed to such dust or gases shall wear protective breathing equipment, approved by the Director-General, and no person in the vicinity shall smoke or use any open light.

10.3.6 All vessels used for the treatment of zinc slimes with acid shall be fitted with mechanical agitators and provided with hoods or other appliances which shall be used to remove the gases or fumes produced in such vessels.

10.4 No dust, fumes or smoke from any extraction system shall be discharged into the atmosphere unless adequate provision has been made to ensure that such discharge is harmless and inoffensive.

10.5.1 At every mine where the manager is required to make an appointment under regulation 2.16.1 the concentration of dust present in the air at the places referred to in regulation 10.2.1 and 10.2.3 shall be determined not less than once in three months and a record kept of the results. Every such determination shall be conducted by or under the direction of the person appointed under regulation 2.16.1.

10.5.2 At mines not referred to in regulation 10.5.1 and at works, where in the opinion of the regional director determinations of the concentration of dust and gases in the air of the working places are necessary he may require such determinations to be made.

B. The following provisions shall apply to the workings of mines—

10.6.1 As far as possible the ventilating air entering a mine shall be free from dust, smoke or other impurity.

10.6.2 The workings of every part of a mine where persons are required to work shall be properly ventilated to maintain safe and healthy environmental conditions for the workmen and the ventilating air shall be such that it will dilute and render harmless any flammable or noxious gases or dust in the ambient air.

10.6.3 Any appliance for ventilation shall be operated and positioned so as to prevent a dangerous accumulation of flammable or noxious gas or dust.

10.6.4 No person shall enter or remain in or cause or permit any other person to enter or remain in any part of the workings if the air contains harmful smoke, gas, fumes or dust perceptible by sight, smell or other senses unless such person is wearing effective apparatus approved for the purpose by the Director-General to prevent the inhalation of such smoke, gas, fumes or dust.

10.6.5 If at any time it is found by the person for the time being in charge of the workings of a mine or any part thereof that, by reason of flammable or noxious gases present in the workings or such part thereof, the workings or such part is dangerous, every workman shall be withdrawn by him from the workings or part so found dangerous and the matter immediately reported to the manager, mine overseer or shift boss, who shall not allow any person to resume work in such working place until he has satisfied himself by personal inspection that the working place is safe: Provided the prohibition relating to the resumption of work shall not apply to persons employed in the presence and under the direct supervision of a competent ganger or miner for the erection of brattice or for other work with a view to clearing away of flammable or noxious gases.

10.6.6 In the general body of the air at any place where persons are required to work or travel, under normal working conditions—

- (a) the amount of carbon dioxide shall not exceed 5 000 parts per 1 000 000 of air by volume,
- (b) the amount of carbon monoxide shall not exceed 100 parts per 1 000 000 of air by volume,
- (c) the amount of oxides of nitrogen shall not exceed five parts per 1 000 000 of air by volume,
- (d) the amount of hydrogen sulphide shall not exceed 20 parts per 1 000 000 of air by volume,
- (e) the amount of flammable gas shall not exceed one comma four parts per hundred by volume, and
- (f) the concentration of dust shall not exceed such standard as may from time to time be specified by the Director-General,
- (g) the amount of oxygen shall not be less than 19 parts per 100 of air by volume.

10.6.7 When tailings are used for filling worked-out areas the moisture contained in such tailings and the liquid draining off therefrom shall not have a cyanide content higher than 50 parts per 1 000 000 by mass expressed as cyanide of potassium or sodium.

10.6.8 The manager shall immediately notify the regional director verbally of the presence of flammable gas in a mine or portion of a mine if—

- (a) flammable gas is detected for the first time; or
- (b) flammable gas has not been detected therein for a continuous period of three months, and such notification shall be confirmed in writing by the manager.

10.7 In every metalliferous or diamond mine unless exempted in writing by the regional director—

10.7.1 the velocity of the air current along the working face of any stope shall average not less than 0,25 metre per second over the working height; and

10.7.2 the quantity of air supplied at the working face of every development end such as a tunnel, drive, cross-cut, raise or winze which is being advanced and at the bottom of any shaft in the course of being sunk shall not be less than 150 cubic decimetres per second for each square metre of the average cross-sectional area of the excavation.

10.8 In every coal mine not exempted in writing by the regional director—

10.8.1.1 The manager shall see to it that a sufficient quantity of ventilating air is continuously supplied to all accessible underground workings of any mine so that the general body of the air at all such workings complies with the provisions of regulation 10.6.6.

10.8.1.2 For the purposes of regulation 10.8.1.1 ‘accessible underground workings’ shall mean all underground workings of any mine which have not been sealed off in a manner prescribed in the code of practice referred to in regulation 10.8.2 or which have not caved in owing to longwall or pillar extraction mining methods.

10.8.2 The manager shall, in consultation with the regional director, compile a code of practice which shall be approved by the regional director and which shall—

- (a) fully set out the means to be adopted to comply with the provisions of regulation 10.8.1.1 and the manner of sealing contemplated in regulation 10.8.1.2;
- (b) specify a procedure for the inspection and the reporting on all relevant matters in respect of ventilation which must be done by the shift boss, appointed in terms of regulation 2.15.1, the competent person, appointed in terms of regulation 2.16.1.1(a), or any other person appointed by the manager for the purpose; and
- (c) if the regional director deems it expedient that a continuous monitoring system be installed and commissioned at any mine, set out in full the layout and details of such monitoring system intended to monitor the presence of flammable gas, and such other gases as the regional director may deem necessary, in the workings of the mine.

10.8.3 After the code of practice referred to in regulation 10.8.2 has been approved by the regional director, the manager shall see to it that all person appointed in terms of regulations 2.6.1, 2.13.1, 2.13.3, 2.14.1, 2.15.1, 2.16.1.1(a), 2.17.1 and 2.18.1 and the responsible miners are made aware in writing of the contents of the said code of practice, and the notices in both official languages, setting out the contents thereof, are posted in a legible form at conspicuous places at the mine where they can be conveniently read by persons employed at the mine.

10.8.4 The regional director, may require the manager by notice in writing, to amend the code of practice referred to in regulation 10.8.2, because of a change in circumstances, after which the manager shall—

- (a) forthwith make the required amendments; and
- (b) see to it that all persons concerned are made aware of that amendment in accordance with regulation 10.8.3.

10.8.5.1 Should the manager wish to amend the code of practice referred to in regulation 10.8.2, he shall notify the regional director in writing in advance of the amendment contemplated, and thereupon the regional director shall in writing either approve or reject the proposed amendment.

10.8.5.2 If the regional director approves the proposed amendment the manager shall amend such code of practice accordingly and see to it that all persons concerned are made aware of the amendment in accordance with regulation 10.8.3.

10.8.6 Any person who fails to comply with any provision of the code of practice referred to in regulation 10.8.2, shall be guilty of an offence.

The code of practice referred to in regulations 10.8.1.1 to 10.8.6 introduces a new concept in the Mines and Works regulations. A code of practice dealt with in the manner provided for in these regulations is in line with the concept introduced by the Minerals Act, 1991, and allows the conditions required for ventilation to be varied for each mine, if necessary.

10.9.1.1 At every metalliferous or diamond mine, where the manager is required to make an appointment under regulation 2.16.1.1(a), determinations shall be made of the ventilation and environmental conditions and the amount of dust in the air in the main airways and at the faces of working stopes, development ends and shafts in the course of being sunk and such other places designated by the manager during the main working shift not less than once in three months.

10.9.1.2 Where in the opinion of the regional director regular determinations of the concentrations of carbon dioxide, carbon monoxide, oxides of nitrogen and hydrogen sulphide in the air of the working places are necessary, he may, require such determinations to be made at such intervals as he may specify.

10.9.2 At any metalliferous or diamond mine not referred to in regulation 10.9.1, and at works where in the opinion of the regional director regular determinations of the concentration of dust and gases in the air of the working places are necessary such determinations shall be made at intervals specified by him.

10.9.3 At every coal mine not exempted in writing by the regional director measurements shall be made during the main working shift not less than once a month of—

- (a) the quantity of air circulating through the mine and each ventilating district, and
- (b) the quantity of air circulating through every working section and the average velocity of the air current along the faces and in the roadways referred to in regulations 10.8.3 and 10.8.4.

10.9.4 In every coal mine measurements shall be made during the main working shift not less than once in six months or at such intervals as the regional director may permit of the amount of dust in the air in representative working places in each section while drilling, cutting, breaking, loading or transfer of coal or rock is taking place.

10.9.5 A record of the measurements made in terms of regulations 10.9.1, 10.9.2, 10.9.3 and 10.9.4 shall be kept.

10.9.6 A return of the average volume of air per minute downcast during the main working shift, the maximum number of persons underground at one time and such other information relating to ventilation, temperature and dust as may be required by the Director-General shall be forwarded to the regional director by the manager of—

- (a) every metalliferous or diamond mine once every 12 months, and
- (b) every coal mine, not exempted by the regional director, once every three months.

10.10 At every metalliferous or diamond mine—

10.10.1 blasting shall not take place in the underground workings more than once in 24 hours except—

- (a) with the permission of the regional director and under such conditions as he may prescribe in writing in respect of any part of the workings,
- (b) in vertical shafts from the surface in the course of being sunk, and
- (c) as permitted by regulation 8.10.44;

10.10.2 after blasting, other than blasting as permitted in terms of regulation 8.10.44, has taken place in any workings no person shall enter or cause or permit any other person to enter such workings until an interval which shall be fixed in writing by the regional director for such workings has expired;

10.10.3 blasting procedures shall be so arranged that no person is exposed to harmful dust, smoke, gas or fumes from blasting;

10.10.4 after blasting has taken place in any part of the workings no person shall enter, or cause or permit any other person to enter, such part or any place liable to be contaminated until a sufficient quantity of fresh air has been caused to flow through such part or place to clear it of harmful dust, smoke, gas or fumes from blasting;

10.10.5 a development end such as a tunnel, drive, cross-cut, raise, box-hole, winze or incline shaft which has advanced 10 metres or more shall be furnished with an apparatus whereby the face and broken rock are effectively wetted for at least 15 minutes immediately after blasting and for a further period of 15 minutes immediately prior to entry by any somebody: Provided that in special circumstances the regional director may give written permission to the manager to vary these periods.

10.10.6 every development end, such as a tunnel, drive, crosscut, raise, box-hole, winze or shaft, and every working connected only with such development end and not with a second outlet, shall be so ventilated by means which will ensure that harmful dust, smoke and fumes from blasting are effectively expelled before the expiry of the interval fixed by the regional director in terms of regulation 10.10.2.

10.11.1 In every coal mine there shall be in every ventilating district a return airway leading to the main return aircourse of the mine. Each return airway, including the main return aircourse, shall be kept fenced off from disused workings and maintained in a proper state of repair. Every such return airway shall be inspected at intervals not exceeding 14 days by a competent person, who is the holder of an appropriate blasting certificate and has been appointed for the purpose in writing by the manager, and shall, in addition, be inspected by a shift boss or an official of more senior rank at intervals not exceeding three months. The results of the aforementioned inspections shall be entered without delay in a book to be kept for the purpose in an office on surface and such reports shall be countersigned by the manager within three days of entry.

10.11.2 If the ventilating current in any part of a fiery mine stops, weakens noticeably, or reverses, the ganger or miner in charge of any section affected shall immediately switch off all electrical power in his section, withdraw all persons from such section to a safe place and shall report the matter to the manager, mine overseer or shift boss. Work shall not be resumed in such section until the ventilating current therein has been restored and the ganger or miner in charge has examined such section and satisfied himself that conditions are safe.

Various devices are in use to assist in implementing the requirements of this regulation. A vane, suspended in the roadway, and influenced by the air velocity, operates a switch which, in turn, switches off all the power to that section. Another type of alarm system is one where the failure of the main fan causes a relay to operate and cut off the power to underground.

10.12 No person shall work or cause or permit any other person to do work in a part of any mine where the conditions are conducive to heat stroke, unless such work is carried out in accordance with a code of practice prescribed by the manager and approved by the regional director.

10.13 In every fiery mine and in every non-fiery coal mine—

10.13.1 every fan shall be installed in such a position as to ensure as far as possible that it is not damaged by an explosion;

10.13.2 except with the written permission of the regional director, every main fan shall be—

- (a) situated on surface,
- (b) provided with an automatic alarm to alert the responsible persons should it stop, and
- (c) provided with power in accordance with the requirements for winding plants specified in regulation 6.5.2.1;

10.13.3 in the event of the main fan stopping for any reason and thereby endangering the safety of persons in the workings, the manager shall ensure that—

- (a) immediate steps are taken to withdraw all persons from such workings to a place of safety,

- (b) as soon as all persons have reached a place of safety all electrical power supplied to the workings ventilated by such fan is switched off, and
- (c) after the main fan has been restarted no electrical power to the workings shall be switched on and no persons other than those engaged in making the necessary examinations shall enter such workings until safe conditions have been restored;

10.13.4 every main fan shall be examined internally and externally together with its appurtenant gear at intervals not exceeding three months by an engineer or competent person appointed in terms of regulation 2.13.2. The manager shall keep or cause to be kept at the mine a book in which such person shall record in ink a true report of the condition of the fan and its appurtenant gear found at every examination. If on any such examination any weakness or defect is found by which the efficient and continuous operation of the fan may be affected and such weakness or defect cannot immediately be remedied, it shall be reported without delay to the manager.

10.14 No fan shall be installed or operated in the workings of any fiery mine or any non-fiery coal mine except under the following conditions—

10.14.1 Where it is intended to install a fan in a return airway from a ventilating district, the regional director shall first be notified. The site of such fan shall be selected by the manager and the installation shall be such that the motor is situated in intake air and there is no possibility of return air passing over the motor and ancillary electrical gear.

10.14.2 In the case of any fan installed elsewhere than in the return airway from a ventilating district—

- (a) each such fan shall be installed at a site personally selected and authorized by the manager or mine overseer,
- (b) no fan shall be operated, or caused or permitted to be operated, if any recirculation of ventilating air takes place,
- (c) no such fan shall be removed without the authority of the manager or mine overseer who shall make a suitable endorsement in the book referred to in regulation 10.14.3, and
- (d) not more than one such fan shall be installed at any one site except with the written permission of the regional director under such conditions as he may prescribe.

10.14.3 Each fan shall be operated in accordance with the instructions given by the manager or mine overseer who shall record in a book provided for the purpose the particulars of the authorization and safety instructions relative thereto. The manager or mine overseer shall ensure that the shift boss and the miner in charge are made aware of such instructions.

The operation of these fans must not be confused with the operation of machinery referred to in regulation 2.13.12(a), as the instructions referred to in this regulation refers only to the way in which the fan is used in connection with ventilation. It does not refer to operation of the fan as an item of machinery.

10.15 No fan shall be started in the workings of any fiery coal mine or any non-fiery coal mine unless tests are carried out with a flammable gas measuring device by a competent person immediately before the fan is started and the atmosphere at the fan, including its motor and electrical accessories has been found to contain not more than one comma four parts per hundred by volume of flammable gas.

10.16 At every mine—

10.16.1 any door directly assisting or in any way affecting the ventilation of a mine shall be either self-closing or be operated by an attendant;

10.16.2 any person who opens a ventilation door, brattice or sheet shall ensure that it is closed again as soon as possible;

10.16.3 any ventilation door, brattice or sheet and its frame shall be taken down when it is no longer required for ventilation purposes; and

10.16.4 no person shall construct, alter, remove or by means of any other act interfere with anything that may have an influence on the flow of ventilating air unless such act is in accordance with the provisions of the code of practice referred to in regulation 10.8.2, or unless such act has been authorized in writing by the manager or a person appointed in terms of regulation 2.16.1.1(a).

10.17 At every coal mine in addition to the requirements of regulation 10.16—

10.17.1 all doors connecting a main intake aircourse with a main return aircourse shall be strongly constructed, afford an effective seal and shall be in duplicate;

10.17.2 all stoppings and air crossings shall be robust and built in such a manner as to prevent leakage. At least one side of every stopping shall be kept accessible for inspection;

10.17.3 non-flammable brattice only shall be used in all headings or other working places in which flammable gas is being or may reasonably be expected to be given off; and

10.17.4 the regional director may prohibit the use of flammable brattice in any ventilating district or at any place and may in his discretion require that brick stoppings be used in particular headings.

10.18 At every mine in which more than 50 persons are at any one time employed underground a tracing or print taken from one of the underground plans referred to in regulation 12.6 or, with the written permission of the regional director, from a plan drawn to a scale of 1 in 5 000, shall be kept and on it shall be shown conventionally in accordance with the Second Schedule to these regulations the ventilating districts, the direction of the air currents, the quantity of air circulating in each ventilating district and the position of each permanent fan, door, regulator, crossing, stopping and telephone.

This tracing shall at all times be correct to within at most three months from date and in the case of a coal mine not exempted in writing by the regional director a white print showing the details required shall be submitted to the regional director at intervals not exceeding three months.

In this regulation reference is made to a telephone and this is a requirement of regulation 24.16.

10.19.1 In the workings of every mine an adequate supply of clear and odourless water shall be provided for dust allaying purposes. Such water shall be supplied in pipes not less than 25 millimetres in diameter at a working pressure of not less than 150 kilopascals when all sprays, jets and other appliances supplied from the same pipe are being operated. Unless exemption in writing is granted by the regional director, such pipes shall reach to a point within 50 metres from the face, from which point a sufficient length of hose shall be provided and used to bring the water up to every place where it may be required for dust allaying purposes.

10.19.2 No person shall negligently cause or permit water supplied from any service pipe for dust allaying or drinking purposes to run to waste.

10.19.3 Stagnant water shall not be allowed to remain on the floors of the levels which are in use.

10.20 In the workings of every mine—

10.20.1 every machine for ripping, picking, cutting, drilling or loading rock, coal or other mineral shall be fitted with means, or means shall be provided, either for applying water effectively to prevent dust being created by the operation of the machine, or for effectively trapping such dust by some suitable apparatus approved by the regional director. The Director-General may prohibit the use of any type or make of machine for ripping, picking, cutting, drilling or loading rock, coal or other mineral where there is evidence that the use of such type or make of machine may seriously and materially endanger the health of workmen;

10.20.2 where rock, coal or other mineral is discharged into any main bin, ore-pass or at any transfer point of a conveyor belt or of an ore-pass system, constant supply of clean water shall be applied by means of efficient atomizers or sprays which shall be kept at all times in good working order, or a dust extraction system shall be provided and operated, to prevent the escape of dust into the air while rock, coal or other mineral is being discharged into the openings of such bins or ore-passes or at a transfer point; and

10.20.3 the floor of every main travelling way, as defined in regulation 6.10, shall be kept wet or otherwise treated to prevent the escape of dust into the air.

10.21 In the workings of every mine no person shall—

10.21.1 perform, or cause or permit to be performed, work of any kind liable to create dust unless the floor, roof, sides and other surfaces where the work is to be performed and any broken rock, coal or other mineral which is being moved or discharged, are effectively wetted and kept wet so as to prevent as far as practicable the escape of harmful dust into the air;

10.21.2 use, or continue to use, any machine for ripping, picking, cutting, drilling or loading rock, coal or other mineral unless the means provided for allaying dust are operating in apparent good order;

10.21.3 use, or cause to be used, any hand-drill, chisel or similar tool except in sampling, unless water is applied, or a wet swab is used round the drill at the collar of the hole, so as to prevent as far as practicable the escape of harmful dust into the air;

10.21.4 use, or cause or permit to be used, compressed air for cleaning—

- (a) any skip or truck underground, or
- (b) the footwall of any stope or development end, other than by means of a tool of a design and construction approved for the particular purpose by the regional director; and

10.21.5 blow out, or cause or permit to be blown out, any hole or socket with compressed air unless the compressed air is applied together with water through a blowpipe approved for that purpose in terms of regulation 9.34.4, except when the collar of the hole or socket is submerged under water.

10.22 In the workings of every mine—

10.22.1 no new type or make of percussion machine drill may be used without the prior provisional approval of the Director-General, or may be continued in use unless that approval is ratified by him within one year, or such longer period as he may determine, and after at least two of the machine drills so provisionally approved have been in regular use on mines. The Director-General may cause to be carried out an inspection or test of any percussion machine drill, device or attachment at a cost to the owner, manufacturer or agent of a sum not exceeding R150 for each complete test;

10.22.2 no person shall use, or cause or permit to be used, any percussion machine drill which is designed to supply water to the drill steel through an internal water tube unless—

- (a) such machine is provided with front-head air release ports of a design approved by the Director-General,
- (b) the axial hole in the piston, when new, has the dimensions specified below for a distance of at least 60 millimetres or such other dimensions as the Director-General may permit—a diameter of not more than 6,65 millimetres and not less than 6,60 millimetres for a piston of diameter of 80 millimetres and not more than 8,13 millimetres and not less than 8,08 millimetres for a piston diameter of more than 80 millimetres,
- (c) the water tube when new, has the dimensions specified below or such other dimensions as the Director-General may permit—an outside diameter of not less than 6,48 millimetres and an outside diameter of not less than 3,96 millimetres for a piston diameter of 80 millimetres or less, and an outside diameter of the water tube of not less than 7,95 millimetres and an inside diameter of not less than 5,56 millimetres for a piston diameter of more than 80 millimetres, and
- (d) the machine drill is fitted with a water tube of such length that, when drill steel of the type supplied for use with the said drill is inserted into the chuck to its fullest extent, when the drill is not operating, the water tube either enters the axial hole on the shank of the drill steel for a distance of at least 25 millimetres or, alternatively, the end of the water tube is not less than six millimetres and not more than 25 millimetres short of the shank end of the drill steel;

10.22.3 in drilling a hole no person shall use, or cause or permit to be used, any percussion machine drill designed to supply water to the drill steel through an internal water tube unless—

- (a) the drill steel is provided with an axial hole which is not less than 4,70 millimetres in diameter when used with a machine having a piston diameter of 80 millimetres or less, and not less than six millimetres in diameter when used with a machine having a piston diameter of more than 80 millimetres and, as far as practicable, the axial hole shall extend over the whole length of the drill steel,
- (b) an adequate supply of water flows through such drill steel, and
- (c) the working water pressure at the machine drill is maintained at not less than 150 kilopascals;

10.22.4 no branch connection shall be connected to any hose supplying water to any percussion machine drill;

10.22.5 no person shall block or otherwise obstruct any of the front-head release ports provided in terms of regulation 10.22.2(a), and no person shall operate or cause or permit the operation of any machine drill if the front-head ports so provided are partially or totally blocked or otherwise obstructed.

Regulation 10.22.6 is one of the regulations where the State would have to prove *mens rea* as outlined in the Introduction. If a water tube was wilfully damaged, then it would be necessary to prove that the accused had intended to damage it and this would fall into the category of *dolus directus*.

10.22.7 the ganger or miner in charge shall during his shift examine the water tube of each machine drill being used or to be used to ensure that it is in proper condition and that, when the machine is not operating, the water tube either enters the water hole in the shank of the drill steel for a distance of at least 25 millimetres or the end of the water tube is not less than six millimetres and not more than 25 millimetres short of the shank end of the drill steel. If the water tube is not in a proper condition it shall be replaced immediately with a proper and undamaged water tube; and

10.22.8 if in the course of a shift any person has reason to suspect that the water tube is damaged or defective, he shall report the matter forthwith to the ganger or miner in charge who shall examine the water tube and if it is found to be damaged or defective, the machine drill shall not again be used until a proper water tube has been fitted.

10.23 The sharpening of drills, maintenance work on trucks and sand-blasting in the workings of every mine shall be carried out only at properly established places, which places shall only be used with the written permission of the regional director, and subject to such conditions as he may prescribe in writing.

10.24 Except in so far as exemption may have been granted by the regional director to such degree and subject to such conditions as he may prescribe in writing, the following provisions shall apply at every coal mine:

10.24.1 No plant for sorting, screening or crushing coal shall be erected in the workings, and no such plant shall be erected on the surface within a distance of 75 metres from any downcast shaft or other opening where ventilating air enters the workings.

10.24.2 Arrangements shall be provided and used at every plant for sorting, screening or crushing coal to ensure that as little coal dust as practicable enters the workings.

10.24.3 Arrangements shall be provided and used in the workings to prevent, suppress, collect and remove, so far as practicable, the fine coal and dust created by mining operations.

10.24.4 In all accessible workings every road shall be treated with incombustible dust to ensure at all times that the dust that can be raised into the air from the floor, roof or sides of the road shall contain not less incombustible matter than is determined in accordance with the following table:

<i>Percentage by mass of volatile matter content, calculated on an ash-free dry basis, of the coal being mined.</i>	<i>Minimum percentage by mass of incombustible matter content.</i>
Over 14, not exceeding 20	50
Over 20, not exceeding 22	55
Over 22, not exceeding 25	60
Over 25, not exceeding 27	65
Over 27, not exceeding 30	68
Over 30, not exceeding 32	70
Over 32, not exceeding 35	72
Exceeding 35	75

For the purpose of this table the volatile matter content of any coal shall be that determined by analysis of a representative section of the seam or of a representative sample of run-of-mine coal from the seam taken within the preceding 12 months. Where no such determination has been made the percentage shall be deemed to exceed 35 per cent.

10.24.5 For the purpose of regulation 10.24.4, the manager shall ensure that a supply of incombustible dust equivalent to at least one week's requirements shall always be available in the workings for distribution and use and that such incombustible dust shall—

- (a) contain not less than 95 per cent by mass of incombustible matter,
- (b) be of such fineness that, when dry, all will pass through a sieve of 600 micrometres aperture and at least 50 per cent by mass through a sieve of 75 micrometres aperture,
- (c) be a limestone dust that does not contain more than five per cent by mass of free silica, or be some other dust that has been approved for the purpose by the Director-General,

- (d) be light in colour and of such character that, unless directly wetted by water, it does not cake and will readily disperse into the air when blown upon, and
- (e) be tested at intervals not exceeding three months for its incombustible matter content and fineness.

10.24.6 For the purpose of determining the adequacy of the measures taken to comply with the requirements under regulation 10.24.3—

- (a) samples sufficient in number and from appropriate locations so as to be representative of dust conditions shall be systematically collected at intervals not exceeding 30 days from the roads in each ventilating district or in each such section of the workings as the regional director, after consultation with the manager, may require,
- (b)
 - (i) each sample shall be collected over a length of road not less than 50 metres in length,
 - (ii) the sample of the dust on the roof and sides shall be taken separately from the sample of the dust on the floor,
 - (iii) in the case of the dust on the roof and the sides the sample shall be taken to a depth not exceeding six millimetres and in the case of the dust on the floor to a depth not exceeding 25 millimetres,
 - (iv) every sample taken shall be representative of the whole surface of the roof and sides or the floor, as the case may be, of the length of road being sampled and shall be collected either by a method of strip sampling by which the dust is collected from a succession of transverse strips 10 centimetres wide and equally spaced not more than five metres apart, or by a method of spot sampling by which the dust for each particular sample is collected from one point for each metre of that length of road,
- (c) each sample shall be well mixed and a representative portion, after drying in the air if necessary, shall be passed through a sieve of 250 micrometres aperture and retained for analysis,
- (d) analysis of the sample shall be carried out by the following method or other methods approved by the regional director:
 - (i) The residue of a weighed quantity of dust, after that quantity of dust has been dried at a temperature not exceeding 140°C and the loss of mass attributable to moisture ascertained, shall be heated in an open vessel to a temperature not less than 480°C and not more than 520°C until the coal is completely burnt away. The incinerated residue shall be weighed.
 - (ii) The sum of the masses of moisture and incinerated residue shall be reckoned as incombustible matter and be expressed as a percentage of the total mass of the dust.

In every case where unsatisfactory conditions are revealed in the places sampled, the return in terms of regulation 10.24.6(e) shall reflect what remedial action has been taken.

- (e) A record shall be kept of the date and place of each sampling and the results of the tests carried out under regulations 10.24.5(e) and 10.24.6(d). A return shall be sent each month to the regional director clearly describing the places sampled and the results of the analyses obtained.

10.24.7 Roads along which coal is moved or transported shall be systematically cleared of any coal spillage and, before any area of the mine is isolated by stoppings, the floor, roof and sides of all roads therein shall be systematically cleared of dust and freshly stonedusted.

10.24.8 Coal tubs shall be constructed and maintained so as to prevent coal dust escaping through the sides, ends or bottom.

10.24.9 Stone dust barriers erected for the purpose of suppressing a coal dust explosion shall be of a design and construction approved by the regional director and located at such points as the manager, in consultation with the regional director, may determine.

10.24.10 The shift boss or an official of more senior rank shall report daily in writing, in a book provided for the purpose by the manager, on the measures taken to ensure compliance with regulations 10.24.3, 10.24.7 and 10.24.8 in the section of the workings under his charge.

10.24.11 For the purposes of this regulation—
‘accessible workings’ shall include all workings other than abandoned workings that have had all entrances effectively sealed by stoppings;
‘incombustible matter’ shall include moisture and combined carbon dioxide;
‘road’ shall include all roads of any description in the workings of the mine extending from the shafts, outlets, or inlets, to within 10 metres of the coal face.

10.25.1 No internal combustion engine other than a diesel engine shall be used underground in any mine.

10.25.2 No diesel engine shall be used underground—

- (a) in any mine unless there is sufficient ventilation to render harmless the exhaust gases produced, and
- (b) in any fiery mine or in any other mine in the workings of which there may be the risk of such diesel engine igniting gas or coal dust unless it is of a design and construction approved in writing by the Director-General, and then only under such conditions and subject to such restrictions as he may specify.

Regulation 10.25.2(b) is very often misunderstood in its application. There are two conditions for the use of a diesel engine underground in a fiery mine, or where there may be the risk of an explosion occurring as a result of the use of the diesel engine. The first condition is that the diesel engine must be of a design and construction approved by the Director-General. This approval is obtained by submitting a sample unit to the Explosion Hazards section of the SABS, which carries out the necessary tests and issues a certificate. When this certificate is submitted to the Director-General, he will then issue the necessary certificate of approval. The second condition is that only an approved diesel engine may be used underground in these particular mines, and then only under such conditions as the Director-General may specify. The first approval is usually obtained by the manufacturer or agent, and the second approval must be applied for by the manager, and included in his application must be a copy of the flameproof certificate issued to the manufacturer or agent.

10.25.3 Every diesel engine used underground shall be provided with means whereby the air entering the engine is cleaned, the exhaust gases before being expelled are cooled and where expelled are diluted, and the emission of flames or sparks is prevented. These means shall be maintained in an effective condition.

10.25.4 Where a diesel engine is used underground samples shall be taken—

- (a) at intervals not exceeding one month, of the general body of the air at representative places and times laid down by the manager and while the engine is running, and
- (b) [Deleted by GN R2062 dated 23 August 1991.]

10.25.5 The operation of a diesel engine underground shall be discontinued until conditions have been remedied—

- (a) if the air at any place where it is being used is found to contain more than 100 parts of carbon monoxide or five parts of oxides of nitrogen per 1 000 000 by volume, or
- (b) [Deleted by GN R2062 dated 23 August 1991.]
- (c) if the engine is found to have any defect which may cause danger to persons;
- (d) if the air at any place where such diesel engine is being used contains flammable gas of one comma four parts per hundred by volume or more;
- (e) if the ventilation flow where such diesel engines is being used stops, weakens noticeably or reverses.

10.25.6 [Deleted by GN R160 dated 1 February 1991.]

10.25.7 Diesel fuel shall be delivered underground in such a manner that no spillage can take place during delivery. When the fuel is piped underground the pipes shall be drained each time after use. The fuel shall be stored underground only in robust closed containers which do not leak. Except with the written permission of the regional director, the quantity of diesel fuel stored underground shall not exceed three days' estimated consumption.

10.25.8 Every underground filling station where diesel powered units are refuelled shall be adequately ventilated, constructed of non-flammable materials and have a smooth impervious floor which at all times must be kept clean.

10.25.9 Refuelling of diesel powered mobile units underground shall be carried out only at such properly established filling stations.

10.25.10 An effective system for extinguishing a fire shall be installed and kept in proper working order at every place where diesel engines are refuelled.

10.25.11 No unauthorized person shall enter any filling station and no person shall smoke or use an open light in the vicinity of any filling station.